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Social Determinants of Adherence to Antiretroviral Therapy among HIV+ Youth

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Walden University

College of Health Sciences

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Wanza Bacon

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the review committee have been made.

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Walden University

2020

Abstract

Social Determinants of Adherence to Antiretroviral Therapy among HIV+ Youth

by

Wanza R. Bacon

MBA, Brenau University, 2001

BSN, Georgia Baptist College of Nursing, 1995

Diploma of Nursing, Georgia Baptist School of Nursing, 1989

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

May 10, 2020

Abstract

Young adults, especially African American men who have sex with men (MSM) have the lowest rates of antiretroviral therapy (ART) adherence among all age groups; however, they experience greater than 50% of all new Human Immunodeficiency Virus (HIV) infections among individuals 13 to 24 years of age. Despite the availability of ART, young MSM continue to experience suboptimal rates of adherence and are one of the most vulnerable populations for contracting HIV. Grounded in the social cognitive theory, the aim for this quantitative cross-sectional study was to investigate the relationship between diverse social determinants and ART adherence among young adult HIV+ MSM age 18-39 living in the state of Georgia (GA). Data obtained from the 2015 GA Medical Monitoring Project were used to conduct the study. The chi-square model revealed there was no relationship between ART awareness based on medication dose and schedule but there was a strong positive relationship between ART awareness and medication instruction adherence with a gamma of .674 (p =.04). The regression analysis showed race/ethnicity (p = .039) and educational attainment (p = .028) were predictors of medication instruction adherence. Whites (p < .029, OR = .168) had a higher likelihood of adhering to instructions than other races/ethnicities. Educational levels (p = .002) were predictors of medication schedule adherence and those with higher educational levels were more likely to adhere to medication instructions. These findings provide valuable knowledge about the association between factors that promote adherence and those that adversely contribute to suboptimal ART adherence among young HIV+ MSM.

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Dedication

This doctoral study is dedicated to two remarkable women, Velma S. Allen, mother and Gracie R. Benjamin, aunt. You set an incredible example for me to follow while also providing me with the fundamental skills I needed to build a solid foundation for success. I am so blessed to have not one but two women to guide and direct my life. You have always envisioned my success and yearned for it even when my path was unclear to me. Without the love you bestowed upon me, encouragement, determination, and support you gave me, I might not be the resilient women I am today. For all that, you have done throughout my life; I am forever grateful and offer you my sincere gratitude.

Acknowledgments

The African Proverb it takes a village adequately expresses my dissertation excursion, as it is truly through the interactions and experiences with diverse people that I have grown and attained this major milestone. Thank you, Heavenly Father, for bestowing your grace and mercy upon me, as I pursued my dissertation.

I would like to extend my deepest gratitude to members of my academic community, Dr. Kai Stewart, Committee Chair and Dr. Peter Anderson, Committee Member for your invaluable discernment of the dissertation process, and the guidance and support you provided. Additionally, I cannot begin to express my thanks to my community of family members, friends, mentors, and other professional colleagues for their patience, belief in my abilities and unwavering support and guidance. To my immediate family (husband, children, grandchildren and siblings), I am deeply indebted to you for patience that cannot be underestimated during my inattentiveness, tardiness or lack of availability during familial activities, insightful suggestions, profound belief in my work, steadfast support and more importantly for your love.

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Section 1: Foundation of the Study and Literature Review

Introduction

Antiretroviral (ART) medication adherence is critically important for controlling viral replication, maintaining health, and reducing viral transmission, and it is a significant part of the human immunodeficiency virus (HIV) treatment regimen because it reduces the amount of HIV in an individual's blood (CDC, 2019; Kim et al., 2014; Shaw & Amico, 2016). Optimal and continuous adherence to ART is essential for maintaining an undetectable level of HIV virus in the blood, which prevents transmission of the disease. Additionally, ART is vital for preventing the development of acquired immune deficiency syndrome (AIDS) and increased mortality and morbidity (Shaw & Amico, 2016). HIV+ adolescents and young adults experience disproportionally high rates of suboptimal adherence to ART, resulting in poorer health outcomes compared to adults. According to the Centers for Disease Control and Prevention (CDC, 2018a), within the United States (U.S.) men who have sex with men (MSM) are at a higher risk and disproportionately affected by HIV infection than any other population, especially African Americans (AA). In this regard, AA MSM are considered a key population. Aho et al. (2014) asserted MSM vulnerability to HIV infection is associated with biologic and behavioral factors such as unprotected receptive anal sex, partner mixing, and drug use. Anal sex is the highest-risk sexual behavior for HIV transmission. It was estimated that the transmission rates for HIV increase by 18 times during anal sex compared to the rate for vaginal intercourse, resulting in a 1.4% risk of HIV acquisition during one act of unprotected anal sex (CDC, 2018b).

Nationally within the United States and globally, young HIV+ adults experience distinctive obstacles to sustaining optimal adherence secondary to their developmental stage such as lack of self-efficacy, stigma, and limited to no awareness and knowledge about the significance of ART (Maskew et al., 2016). Young adults are in a transitional stage of development, as they are evolving from adolescence to adulthood, which involves a considerable amount of cognitive and social developmental milestones (Shaw & Amcio, 2016). This research may assist in developing interventions that mitigate obstacles to optimizing ART adherence in young adults. According to Shaw & Amcio (2016), national studies have been conducted to address ART adherence among MSM, but adolescents and young adults are vastly underrepresented in evidence-based adherence interventions, despite their varied and distinct needs and obstacles.

I will investigate relationships between factors that influence ART adherence, which include social determinants (age, ethnicity, educational attainment, income, and ART insurance coverage), engagement in care, viral load suppression, and ART adherence among young adult MSM who are HIV+ between the ages of 18 and 39 in the state of Georgia. Viral Suppression occurs when HIV medications decreases the amount of HIV in the body (viral load) to undetectable levels, which keeps the immune system working and prevents illness (CDC, 2019). Adolescents and young adults are individuals who range in age from 15 to 39 (Isenalumhe, Fridgen, Beaupin, Quinn, & Reed, 2016; Lang, David & Giese-Davis, 2015).

There is a need for public health practitioners and researchers to develop a combination of preventative tactics and intervention strategies that concentrate on individual behavior change and biomedical and structural interventions within a contextual perspective. Knowledge attained from the study may provide a more comprehensive understanding of how to reduce the progression of HIV to AIDS and death. The study has implications for positive social change, as it may lead to sustainable reductions in MSM nonadherence to ART for HIV + youth under the age of 18. Public health practitioners may be able to use the results of this study to reduce HIV transmission and mortality rates among young HIV+ MSM while also increasing all HIV+ MSM awareness of life-saving resources.

In support of public health practitioners and researchers need to investigate the association between social determinants and young adult adherence to ART, Section 1 will include the problem and purpose statements. It will also include the research questions, hypotheses, framework, theoretical foundation and nature of the study. Lastly, Section 1 will contain the literature review, definitions, assumptions, scope, delimitations, significance, summary, and conclusion.

Problem Statement

Young adults, especially AA MSM, have the lowest rates of ART adherence among all age groups; however, they experience greater 50% of all new HIV infections among individuals 13 to 24 years of age and have HIV rates that are three to five times higher than other ethnic groups (Voisin et al., 2017). Despite the availability of biomedical interventions such as ART, young MSM continue to experience suboptimal

rates of adherence and are recognized as one of the most vulnerable populations for HIV infection (Bekker & Hosek, 2015; Voisin, Quinn, Kim & Schnieder, 2017). Young adults have distinct needs relative to HIV prevention interventions and secondary to their developmental status as well as limited awareness, confidence, and interpersonal skills, which may lead to indulgence in terms of behaviors that increase their potential to contract HIV (Pettifor et al., 2013). There is limited evidence to support how youth comprehend, seek, and retain care and recognize the significance of HIV testing and prevention services as well as the dynamics that influence the efficiency of biomedical prevention strategies (Kurth, Lally, Choko, Inwani, & Fortenberry, 2015; Pettifor et al., 2013). Additionally, there is limited HIV prevention awareness among the target population relative to the effectiveness of comprehensive HIV prevention strategies that integrate behavioral, structural, and biological factors (Firestone et al., 2014; Pettifor et al, 2013). Minority MSM failure to use healthcare was attributed to access issues relative to lack of insurance or being underinsured, transportation barriers, stigma, and engendered mistrust (Eaton et al., 2015). Additionally, there is limited research supporting engagement in care outcomes for minority MSM and how missed clinical appointments may contribute to ART initiation, viral suppression, or their survival.

Young adult MSM HIV treatment and management involves ART, issues relative to long-term adverse medication reactions, and a sense of disinhibition following ART initiation, adherence, and resistance (Machimba et al., 2013; Pandhi & Ailawadi, 2014). Disinhibition includes impulsive behaviors, externalization or destructiveness, illegal

drug use, and poor risk assessment and contribute to adolescents' risky sexual behaviors (Machimba et al., 2013).

ART adherence plays an essential role in regulating viral replication, preserving health and decreasing viral transmission; however, globally, there is inadequate data regarding adherence among adolescents and young adults, especially in the MSM population (Hightow-Weidman et al., 2017; Kim et al, 2014). Exploration of the research topic could help to fill the gap between ART adherence among adolescents and young adults and the MSM population, as it may assist in gaining knowledge about factors that contribute to youth's nonadherence to ART and provide insights relative to the significance of creating young adult-centered prevention strategies within a social-economic context for key populations such as MSM. Additionally, the results of this research may contribute to reductions in not only current rates of HIV infection but also deaths among this population. Adherence to the treatment regimen is critically important to sustain HIV suppression and decrease the risk of medication resistance and results in a better quality of health and life and reduces HIV transmission and mortality (National Institutes of Health [NIH], 2018).

Purpose

The purpose of this quantitative cross-sectional study is to identify factors that influence adherence to ART among young MSM whose HIV status is positive. This will be accomplished by investigating the relationship between the independent variables ART insurance coverage, engagement in care, and viral load suppression and the dependent variable ART adherence as measured by dose, schedule, and instructions.

Additionally, determinants such as age, ethnicity, income, and educational attainment that may contribute to ART nonadherence in the study population will be examined. Considering that MSM are a key population with the highest rates of newly diagnosed HIV within the United States (CDC, 2018), the proposed research has the potential to contribute to literature because there is limited research on the association between factors that could influence young HIV+ MSM adherence to ART.

Research Questions and Hypotheses

The following research questions will be addressed:

RQ1: Is there a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

$H_0$1: There is no relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

$H_0$1: There is a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ2: Is there an association between age, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

$H_0$2: There is no association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_a2: There is an association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ3: Is there is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

$H_0$3: There is no relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_a3: There is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

Theoretical Foundation for the Study

The social cognitive theory (SCT) is the theoretical framework that I will use to direct and support the research study. The theory posits knowledge occurs through social context with a dynamic and mutual interface between the person, environment, and behavior (Glanz, Rimer, & Viswanath, 2015). The theory has been used as an invaluable public health tool in health promotion, especially among youth and provides an essential foundation for understanding the development of human behavior. The SCT is related to the initiation and attainment of personal and group-level changes and maintenance of health-related behavior modifications and relapse prevention, which is essential to

medication adherence in youth (Glanz et al., 2015). A central concept of the SCT is reciprocal determinism. A central concept of the SCT is reciprocal determinism. According to Adefolalu (2018), reciprocal determinism refers to the dynamic interaction of the triadic influences between an individual's behavior, personal factors, and the environment. In this regard, the construct of reciprocal determinism will be used to address personal determinants of health (age, ethnicity, educational attainment, income, and ART insurance coverage), which constantly influences the other. These social environmental factors influence both personal and behavioral factors such as young MSM's capacity to adhere to ART.

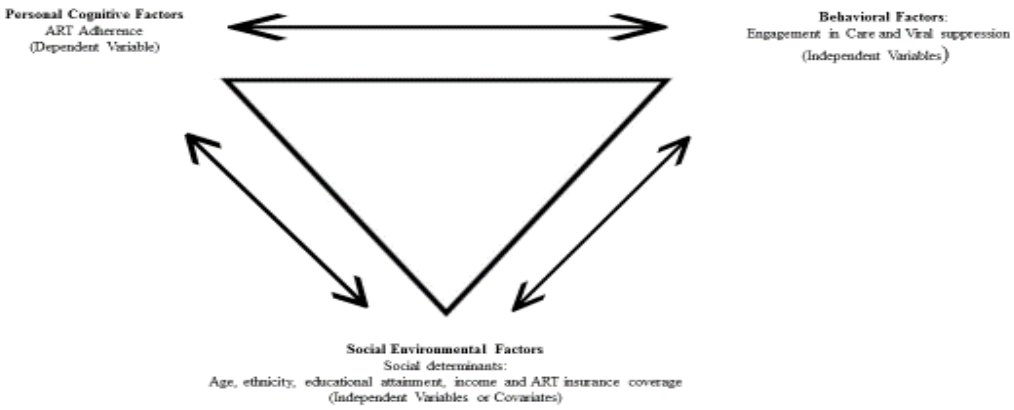

Figure 1. Link between SCT theory constructs and study variables.

Nature of the Study

The proposed study is quantitative in nature and based on a secondary analysis of cross-sectional survey data. Secondary data will be obtained from the Georgia Medical

Monitoring Project (GMMP) surveillance summary. The MMP is a CDC-funded surveillance project that produces data on persons living with HIV in Georgia. This data was selected because it contained information relative to the variables of interest and the MSM population. The quantitative design was used because it will assist in determining if there is an association between the independent and dependent variables. Additionally, the quantitative design will allow me to use measurable data to discuss facts about the research findings and reveal any patterns in the study. The cross-sectional study design will also assist in determining if an association exist among the identified variables.

Independent Variables

The Georgia Department of Public Health [GDPH] stated Age is defined as the chronological age of the research participant at the time of the interview in terms of years and ethnicity is defined as race. Participant incomes represent the combined yearly household income in U.S. dollars, which ranges from $0 to > $75,000 (GDPH, 2015; Assistant Secretary for Planning and Evaluation, 2018). Educational attainment is the highest level of education an individual has completed (National Center for Educational Statistics [NCES], 2018). Health insurance and other ART coverage are terms used to categorize resources used to provide coverage for ART medications 12 months prior to being interviewed for the Georgia MMP (GDPH, 2015). The GDPH (2015) stated engagement in care refers to primary HIV healthcare, which is measured by participants' use of healthcare services, the number of viral load tests obtained within a 6-month period, and receipt of at least one cluster of differentiation 4 (CD4) tests annually (GDPH, 2015). The CD4 test measures the number of white blood cells that fight

infection and play an important role in a person's immune system. Replication of the HIV virus within an individual's body is commonly referred to as the viral load.

Dependent Variable

ART medication adherence refers to following a specific dose, set of pills, spoonful, or injections of ART medications according to a prescribed schedule or special instructions (GDPH, 2015)**.** The SCT framework will be used to support and direct this research. Specifically, the behavioral change constructs embedded within the SCT will be used because they could help explain factors that influence young HIV+ MSM adherence to ART (Adefolalu, 2018). Further, to examine the relationship between the variables that influence young HIV+ MSM adherence to ART, statistical analysis will be conducted using data obtained from the Georgia MMP surveillance summary about the target population's health behaviors. Descriptive and inferential statistical analysis will be conducted on the approved dataset using Statistical Package for Social Sciences (SPSS) software. Inferential statistical tests may include correlations, regression, and analysis of variance.

Literature Search Strategy

To examine the relationship between social determinants, engagement in care, viral load suppression, and ART adherence among the study population, multiple electronic databases were accessed. Research used to support the study were published between 2014 and 2019. The specific databases included Google Scholar, Google,

Academic Journals, PubMed, ProQuest, Cumulative Index to Nursing, Science Direct, Allied Health Literature (CINAHL), and EBSCOHost.

The following are key search terms used for literature search strategy: Human Immunodeficiency Virus (HIV), adolescents, youth, young adults, MSM, viral load suppression, clusters of differentiation 4 (CD4), antiretroviral therapy, prep-exposure prophylaxis, medication adherence, HIV awareness, social determinants, engagement in care, antiretroviral insurance coverage, educational attainment, social cognitive theory, transtheoretical model, reciprocal determination, disinhibition, Affordable Care Act, peer pressure, youth developmental stages and associated challenges, barriers to ART adherence, HIV vulnerability, HIV care continuum, retention in care, insurance programs for HIV care, The Boolean operator AND was used to combine and broaden the research terms.

Literature Review Related to Key Variables and/or Concepts

ART Adherence

The introduction of ART medications or therapy changed the devastating impact of the HIV pandemic on population health nationally and globally and prevented deaths in greater than 80 million (Iacob et al., 2017). The development of these advanced treatments has altered the landscape of HIV from a death sentence to a curable chronic disease (Iacob et al., 2017). ART adherence is essential to optimal management and treatment of HIV; however, its efficacy is contingent upon individual medication adherence (Yang et al., 2018). While precise levels of adherence required to reduce

mortality, drug resistance, and viral rebound differ based on the medication and treatment regimen, increasing levels of adherence to ART, as evident by viral load suppression rates are associated with improved health outcomes (Puskas, 2017).

Morrison, Stauffer, and& Kaufman (2015) said adherence is the ratio between the numbers of medication dosages taken and the amount prescribed over a period. Chakrabarti (2014) defined adherence as a process by which a proper treatment regimen is prescribed by a clinical provider after engaging in an appropriate conversation with the patient. Medication adherence is a significant behavior that is necessary over one's lifespan for prevention and management of disease and the preservation of health (Molloy & Carrol, 2017). Medication adherence is important to sustaining HIV suppression and decreasing the risk of medication resistance, when practiced routinely adherence results in a better quality of health and life, and reduces HIV transmission and mortality (NIH, 2018). The literature is saturated with studies concerning the significance of medication adherence, especially relative to ART adherence in individuals living with HIV and AIDS. C. Everett Coop, former U.S. Surgeon General, stated medications do not work in individuals who do not take them (Lindenfeld, 2017). In this regard, it is important to understand the challenges of maintaining adherence to ART and the clinical implications of nonadherence in adolescents and young adults infected with HIV because 42% to 80% of these individuals report suboptimal adherence to ART (Voisin et al., 2017).

Among individuals within the U.S., the prevalence of HIV/AIDS disproportionally affects young adults, racial and ethnic minority groups, and MSM at

rates higher than other demographic groups (Gross, Hosek, Richards, & Ferandez, 2016). Young adults experience distinct challenges with medication adherence secondary to their developmental stage. These challenges may include lack of fiscal resources, lack of privacy at school for medication administration, and having to take multiple medications. Additionally, the adolescent developmental stage is a conundrum of mental, physical and emotional maturation; it is a challenging crossroads (Kim, Gerver, Fidler & Ward, 2014; NIH, 2018). The developmental stage of adolescence is a period where young adults are striving for their independence, fixate on themselves and their self-image, need peer approval and support, engage in risk-taking behaviors, and have evolving decisional capacities (NIH, 2018). Kim et al. (2014) said adolescence and young adulthood is a period of identity formation, indulgence in behavioral experimentation, engagement in high-risk sexual behaviors, alcohol, and drug use, limited life skills and knowledge, lack of fiscal autonomy, and resistance to engagement in medical care.

ART adherence is a critical component of the HIV treatment cascade and care continuum, a framework established in 2013 which is comprised of five primary stages: diagnosis, linkage to care, retention in care, ART adherence, and viral suppression (Kay, Batey, & Mugavero, 2016). To achieve optimal outcomes from HIV treatments, exceptional adherence (>95%) to ART is necessary, as it preserves the functionality of the immune system (Coetzee, Kagee, & Bland, 2015; Govind et al., 2017). The immune system weakens when CD4 counts are reduced and increases the risk for opportunistic infections as well as non-AIDS and AIDS-related diseases secondary to prolonged inflammation (Coetzee et al., 2015; NIH, 2019).

Characteristics: Young Adult MSM Versus Adult MSM & ART

Diverse individual factors within a population are associated with suboptimal ART adherence among MSM (Iacob et al., 2017). General factors relative to MSM suboptimal adherence include the complexity of the medication regimen, side effects of ART, individual behaviors, use of illegal drugs and alcohol, depression, and other diseases or comorbidities germane to each individual person (Iacob et al., 2017). Stigma and lack of disclosure about HIV status were found to be challenges associated with MSM adherence to ART and were consistent with all HIV populations. Issues relevant to young MSM included stigma-induced economic and social issues, challenging relationships with healthcare providers, community-based and clinical care associated discrimination, and the lack of availability of MSM-friendly clinical services (Michen et al., 2017). Iacob et al. (2017) found that young MSM ART nonadherence was attributed to stigma, depression/anxiety, fear of inadvertent disclosure, social isolation, lack of social support and participation in criminal or inappropriate social groups, limited communication skills and education, lack of motivation, logistical barriers, overlooking medication doses, and inconsistencies in routine and travel (Iacob et al., 2017; Zanoni & Mayer, 2014). Adult MSMs experience challenges consistent with young MSM which include stigma, social isolation, and barriers to accessing healthcare programs (Iacob et al., 2017). Iacob et al. (2017) said fear of engagement and rejection of care and the lack of availability of data regarding ART interactions and hormonal treatment (for individuals using hormones) were germane to adult MSM.

Among young African American HIV+ MSM, factors that contributed to suboptimal ART adherence were consistent with Iacob et al. (2017) study findings; however, Voisin et al. (2017) study results found that low self-efficacy and exposure to community violence where additional factors that contributed to suboptimal ART adherence. Alcohol (OR: .150, 95% CI: .037–.606) and marijuana usage (OR: .235, 95% CI: .066–.832) were indicative of poor adherence to ART among African Americans as well (Voisin et al., 2017). Alcohol and marijuana are commonly used as coping techniques for HIV diagnosis and may hinder engagement in care (Voisin et., 2017). Further, substance usage is a barrier for not only engagement or initiation in care but also medication management skills, and on occasion can result in depression (Voisin et al., 2017). Among racial and ethnic MSM minority groups, self-efficacy was the strongest predictor of ART adherence (Voisin et al., 2017).

Medication adherence in HIV+ individuals does not correlate with traditional findings in the literature for medication adherence. Traditionally, elderly adults and children are at greater risk for medication nonadherence due to factors such as medication complexity, side effects, socioeconomic factors, mistrust of healthcare providers, and healthcare systems, and cognitive decline (Frances, Thirumoorthy, & Kwan, 2016). A young person's age serves a potential contributor to their nonadherence secondary to their limited knowledge and understanding about the disease or treatment, family structure, culture, fiscal status, medication regimen and at times, the medication's taste (El-Rachidi, LaRochelle, & Morgan, 2017). Additionally, the young may be dependent on their parents and other social support to assist with their medication adherence (Kay et al.,

2016). According to Adefolalu (2018), the SCT is relevant to the management and treatment of chronic diseases because it may assist individuals with learning pertinent information about HIV and AIDS and the necessary steps they need to take regarding their disease and the related health issues such as ART adherence and the establishment of supportive relationships.

Social Determinants

Social determinants of health (SDOH) are factors that influence a person's state of health and disease and shape an individual's health, functioning, and quality of life outcomes and risks (Artiga & Hinton, 2018; Healthy People 2020, 2018a). These conditions are formed by the dissemination of resources, money, and power at the global, national, and local levels (World Health Organization [WHO], 2018a). Additionally, SDOH are responsible for health inequities, which are biased and preventable differences in health status evident within and between countries (WHO, 2018a). These determinants are the primary cause of health disparities throughout the lifecycle and profoundly influence the development of young adults and contribute to the social modeling of health, disease, and illness (CDC, 2014; Tebb, Pica, Twietmeyer, Diaz, & Brindis, 2017). SDOH are dynamic in nature and may be biological (age), individual (unprotected sex), social (income, gender), and physical environment (living conditions) and health (access to healthcare) factors that interact with and influence individual behaviors (CDC, 2014).

ART and Other Insurance Coverage

The ability to obtain and access healthcare and the quality of care received are significant determinants of health (Ludema et al., 2017). According to Sommers et al. (2017), evaluating the effect of insurance coverage on health is multifaceted because its impact occurs over an extended period, varies based on the insurance design, and may be misinterpreted based on confounding factors, since insurance changes are associated with other issues that influence healthcare usage and outcomes. In 2011, there were 30,400 uninsured individuals who died annually due to a lack of insurance (Powell & Xirasagar, 2017). Lack of insurance served as a proxy for risk factors such as individual health behavior or socioeconomic status contributed to premature death (Sommers et al., 2017). Absence of health insurance serves as a barrier to medical care and contributes to poorer health outcomes, as the uninsured do not readily seek out timely care (Sommers et al., 2017). Insurance is an instrument that improves fiscal security and decreases risks for large unpredictable medical costs, increases access to preventive services, which can directly maintain or improve health, enhances self-perceptions of health, and is important for individuals with chronic diseases such as HIV (Sommers et al., 2017). Further, the availability of insurance affects all stages of the HIV continuum of care including HIV diagnosis, linkage and retention in care, and prescribing of ART through viral suppression (Kay et al., 2017).

Young adults with chronic diseases such as HIV/AIDS are at 50% higher risk for being uninsured and have 33% lower rates of health insurance coverage than any other age group (Coetzee et al., 2015; Spencer et al., 2018; U.S. Census, 2018a). Likewise, in

2015, individuals infected with HIV had an uninsured rate of 11% compared to an uninsured rate of 13% in individuals who are uninfected (Dawson & Kates, 2019; Zanoni & Mayers, 2014). The availability of health insurance or medication coverage is significant in maintaining ART adherence and preserving life among young adults (Mizuno, Beer, Huang, & Frazier, 2017).

Prior to the Affordable Care Act (ACA), minority, racial/ethnic groups were disproportionately affected by HIV, underprivileged, and uninsured (Ludema et al., 2017). The expansion of the ACA resulted in better health outcomes, greater access to primary care, increased ambulatory care visits, improved use of prescription medications, and enhanced medication adherence (Ludema et al., 2017). As it relates to young adults, the ACA facilitated greater access to care, as one of its tenets required insurers to allowed family members to remain on parental private insurances until they were 26 years of age (McMorrow, Kenney, Long & Anderson, 2015). For young adults with higher incomes, the ACA contributed to reductions in the number of uninsured; however, among those with lower and modest incomes, there were substantial reductions (49%) in the number of uninsured, especially in states with Medicaid expansion compared to 27% in nonexpansion states (Chaudry, Jackson, & Glied, 2019; McMorrow et al., 2015).

The ACA eliminated barriers to care for HIV/AIDS-infected individuals because it prevented the denial of health insurance based on preexisting health conditions, which historically served as an obstacle to obtaining or being dropped from coverage (U.S. Department of Health and Human Services [DHHS], n.d.). Additionally, the ACA established essential health benefits which establish a minimum set of benefits that must

be provided under an insurance plan (DHHS, n.d.). The benefits include prescription medication services for chronic diseases, mental health and substance use disorder services, as well as inpatient hospitalization and laboratory testing, essentially ensuring comprehensive primary, urgent, and emergent healthcare is available to everyone (DHHS, n.d.). Despite the benefits inherent in the ACA, Spencer (2018) asserted there is an age gradient between adolescents that revealed worse health insurance coverage and access for younger and older adolescents, peaking among young adults. Further, as youth transition into adult care, they may experience challenges relative to continuity of care and the type of insurance available to them, which may negatively influence access to care and ultimately ART adherence (Spencer, 2018).

Medicaid

The U.S. Medicaid program provides health insurance to individuals with low incomes. The program is a federal-state partnership which allows each state and territory to implement their own Medicaid program in compliance with wide-ranging federal guidelines (Zhang et al., 2015). In addition to being the largest public health insurance program in the nation, Medicaid provides healthcare coverage to 50% of all people with HIV in the U.S. (Zhang et al., 2015). From 2012 to 2014 (Kates & Dawson, 2017), HIV-infected individuals residing in non-Medicaid expansion states did not realize a significant increase in coverage; however, there was a significant increase in dependence on the Ryan White HIV/AIDS federal programs through the Health Resources and Services Administration (HRSA) which provided state-based funding in support of HIV care which consists of the AIDS Drug Assistance Program (ADAP).

Ryan White Program

According to Lunden et. al., (2017), ADAP provides HIV prescription drug coverage to individuals with limited to no fiscal resources. The researchers found that health insurance coupled with prescription drug coverage resulted in greater usage of ART among all HIV-infected groups.

As the Ryan White law is currently written, all individuals receiving ADAP must be HIV-positive, low-income, and underinsured or uninsured and the services must be equally and constantly available to all eligible participants throughout a state (HRSA, 2017). ADAPs may also assist in linking individuals to other care and support services. As an example, ADAP funds may be utilized to secure health insurance for services that improve access to care, ART adherence and monitoring of ART drug treatments (HRSA, 2017). ADAP eligibility is contingent upon state-based requirements and participants in the program must provide evidence to support their state residency status and meet the fiscal requirements that are based on the Federal Poverty Level guidelines (HRSA, 2017).

Private Insurance

Treatment benefits covered via private insurance is contingent upon the state's insurance laws. Historically, private insurances required applicants to be prescreened for pre-existing chronic health diseases or health risk prior to offering the individual insurance (Spencer et al., 2018). Insurance premiums varied based on the identified disease or associated health risk (Spencer et al., 2018). Additionally, there were limits on benefits and out-of-pocket expenses were costly (Kates & Dawson, 2017; Spencer et al., 2018). Privately insured HIV+ individuals experienced challenges maintaining their

health secondary to the cost relative to premiums, co-pays, deductibles, and costs of services, such as specialty care, that was not covered by insurance policies (Kates & Dawson, 2017; Spencer et al., 2018). Often times, private insurance policies had limits on services needed by those with HIV/AIDS such as case management, substance abuse and mental health abuse, transportation assistance and specialty care (Spencer et al., 2018). The ACA's tenants have abated many of the historical barriers to care HIV infected individual's experienced (Kate & Dawson, 2017). The ACA played a critical part in increasing insurance coverage for HIV infected individuals through Medicaid expansion, despite that fact that not all states participated in the expansion (Kate & Dawson, 2017).

Race/Ethnicity

According to Khahana et al. (2016), among HIV+ cohorts within the U.S., minority racial/ethnic groups experienced the lowest levels of ART adherence and viral load suppression even after controlling for confounding factors such as demographics, mental health and substance use. Across the U.S. racial/ethnic variances in viral load suppression existed across all age, sex, and transmission classes with the lowest incidence of sustained viral suppression being among young African Americans, 13 to 24 years of age (Crepaz, Dong, Wang & Hernandez, 2018). Multiple barriers such as culture, being uninsured, access to care issues, health literacy, stigma, issues relative to trust in the health care system and providers were attributes that resulted in the lower incidence of sustained viral load suppression among African Americans (Crepaz et al., 2018). Additionally, these health care disparities may partially be secondary to a late diagnosis of HIV infection and poor adherence to ART therapy as well as racial/ethnic-based

medical mistrust, which is a significant predictor of ART nonadherence among people who are HIV+ (Kalichman, 2016). Beer et al. (2016) asserted while racial/ethnic disparities remain across all populations when analyzing ART prescriptions and viral suppression among HIV-infected persons in care, disparities among MSM were not found.

Educational Attainment

Educational attainment is a social determinant that influences diverse aspects of life and is the most significant modifiable social determinant of health (McGill, 2016). The quality and length of education is a predictor of employment and income and affects whether a person can afford health care and increases an individual's potential for future well-being (McGill, 2016). Additionally, low education attainment is associated with more stress and lower self-confidence (WHO, 2018b). Health threats connected with social determinants create barriers that prohibited people from achieving optimal health (Stahre et al., 2015). According to the U.S. Census Bureau (2018b), in 2017, 80 percent of African Americans over the age of 25 completed high school and received their diploma; however, the numbers are 10 percentage points lower than the national average. Additionally, in 2017, 23.9 percent of African American adults received a bachelor's degree or higher, which is substantially higher than 19.8 percent in 2010. Despite these increases, there continues to be a racial gap relative to educational attainment among African Americans, especially males. Individuals who are HIV+ with lower educational attainment experienced worse health outcomes after initiating ART therapy including higher rates of new AIDS events and mortality (del Amo et al., 2017). Stevens et al.

(2017) found that MSM who did not finish high school were more likely to engage in transactional sex, which heightened their risk for HIV infection. Solomon et al. (2018) said individuals with higher educational attainment initiated ART after being newly diagnosed with the HIV infection. Information relative to the timing of initiation was not provided. Younger MSM, individuals 19 years of age and less who did not complete high school) were not as likely to receive HIV testing as those who completed high school (Solomon et al., 2018).

Income

According to Braveman and Gottlieb (2014), socioeconomic dynamics inclusive of income, wealth, and education are fundamental reasons for an array of health outcomes. The socioeconomic dynamics play a prevailing role for social factors instead of medical care in shaping health through diverse health indicators, settings, and populations (Braveman & Gottieb, 2014). Higher income is associated with being healthier (WHO, 2018b). More specifically, the larger the gap between the affluent and underprivileged, the larger the differences in health (WHO, 2018b). Chokshi and Cohen (2018) stated race, sex and educational attainment act together and confounds the income-health relationship.

Among HIV-infected individuals, unemployment and limited access to fiscal resources have been associated with suboptimal ART adherence (Nachega et al., 2015). ART adherence was higher in HIV+ individuals who were gainfully employed compared to those who were not, especially those in low- and high-income countries (Nachega et al., 2015). ART nonadherence was related to the adverse effects unemployment had on an

individual's mental health, depression and compromised psychosocial health (Nachega et al., 2015). Additionally, unemployment, lack of income and poverty contributed to food insecurity, barriers to transportation and access to health care, which are implicated in suboptimal ART adherence in young adults (Ammona, Mason, & Corkery, 2018; Azia, Mukumbang, & Van Wyk, 2016).

Employment and the availability of fiscal resources are critical to maintaining optimal adherence to ART. Employment has the potential to mitigate contextual barriers to ART adherence by promoting greater access to health care services secondary to the availability of employer-based insurance and health care programs that encourage engagement in HIV treatment (Azia, Mukumbang, & Van Wyk, 2016; Nachega et al., 2015). Employment may eliminate food insecurity, improve housing quality and facilitate reductions in poverty, which may positively influence the quality of life of young adults infected with HIV (Nachega et al., 2015).

HIV infection among MSM is a complex array of diverse factors operating at different levels (Gourlay et al., 2017). In this regard, obtaining a comprehensive understanding of factors that influence medication adherence from as social and environmental context is essential for the development of multi-level strategies to reduce the risk of HIV acquisition among high-risk MSM (Gourlay et al., 2017). Understanding contextual factors associated with young adults' progression through the HIV care continuum connects to the SCT constructs and reciprocal determinism in learning behaviors that are supportive of ART medication adherence. The SCT may be used to assist patients with chronic illnesses such as HIV by providing them relevant information

about HIV and AIDS and the potential actions to take in making decisions about the disease and its associated health challenges such as adherence (Adefolalu, 2018).

Linkage to Care

To mitigate disease advancement and continuous transmission of HIV, young MSM who are HIV+ must be effectively linked to timely health care (Zanoni & Mayer, 2014). Effective linkage of HIV+ MSM to care is significant because connectivity to and engagement are the primary bridge to obtaining the health and preventative benefits of ART (Iacob et al., 2017). Numerous studies revealed young individuals who are HIV+ have lower rates of linkage to HIV care (29% to 73%) within the first year of diagnosis than other groups (Zanoni & Mayer, 2014). In 2014, approximately 62% of young HIV+ individuals in the U.S. linked to care within 6 to 12 months (Zanoni & Mayer, 2014). Barriers that may contribute to suboptimal linkage to care are: (a) perceived discriminatory practices by clinical providers, (b) deficient medical guidance and continuation in care, (c) clinic operational hours or location are not easy to access, (d) concerns with disclosure of HIV diagnosis, (e) psychological challenges associated with obligating to long-term care and (f) concerns relative to HIV treatment include medication side effects, inadequate information and understanding of the benefits of ART and the scheduling of medications at inconvenient times (Liu et al, 2016).

Engagement in Care

Engagement in care is an integral part of the HIV continuum and refers to a traditional source for primary HIV health care (GDPH, 2015; Sabin et al., 2017). The first stage of engagement in care occurs when HIV+ individuals are linked to care or

completes their initial medical appointment within 30 days after diagnosis (Dombrowski & Kinney, 2017). Philbin et al. (2014) described linkage to care as a process whereby newly diagnosed HIV+ individuals initiate HIV-related medical, psychological and social services. Philbin et al. (2014) asserted engagement in care is the maintenance of HIV-related health care that requires adherence to clinical appointments for three to six months.

Young adult African American MSM do not obtain timely medical treatment or engage in care, which increases their HIV transmission rates because upon entering into care, they are found to have an advanced stage of HIV disease (Dombrowski & Kinney, 2017). This is significant because engagement in the HIV care continuum is an essential precursor to retention in care, initiation of ART and viral suppression, thus crucial in maximizing the effects of ART globally (Dombrowski & Kinney, 2017; Genberg et al., 2016). Numerous barriers may negatively influence engagement in HIV care, limiting the efficiency of strategies aimed at improving health outcomes and reducing new HIV transmissions (DHHS, 2016). Similarly, there are diverse factors that positively influence or facilitate engagement in HIV care (Yehia et al., 2015).

Barriers to Care

Linkage, engagement, and retention in HIV care are essential to sustaining life and reducing the risk of HIV transmission (Genberg et al., 2016). HIV+ African American MSM who do not engage in care experience higher morbidity and greater mortality than those in care (Eaton et al., 2015). Deterrents to care are multifactorial and

may include sociodemographic, clinical, and personal characteristics (Liu et al., 2016; Yehia et al., 2015).

Distance from Clinic

Dasgupta et al. (2015) asserted, within the US, travel-related obstacles contributed to delays in MSM receiving primary HIV care. More specifically, the distance and amount of time traveled as well as the mode of transportation were associated with considerable obstacles to engagement in care (Dasgupta et al., 2015; Liu et al., 2016; Sharma, Barnabas, & Celum, 2017). Accessibility to public transportation, a personal means of transportation, and the amount of traffic encountered was contingent upon an individual's neighborhood and served as a significant predictor of commute time and subsequent poor engagement in care (Dasgupta et al., 2015). Further, public transportation via a bus or train compared to private/personal transportation served as an obstacle to care (Dasgupta et al., 2015). Other obstacles associated with the distance from the clinical site that contributed to suboptimal engagement in care included regional differences in home locations and the availability of providers within close proximity (Dasgupta et al., 2015; Liu et al., 2016). Liu et al. (2016) found that the inflexibility of work schedules (9 a.m. to 5:00 p.m.) and the operational hours for medical services (Monday – Friday from 8:30 a.m. to 5:30 p.m.) resulted in challenges relative to the distance traveled. The inflexibility of clinical hours and job schedules did not allow enough time for patients to arrive timely to their appointment (Lieu et al., 2016). Hightow-Wideman et al. (2017) asserted, among young African American HIV+ MSM,

transportation challenges and an inconvenient location for clinical services were the most common contributor to suboptimal engagement in care.

Stigma and Discriminatory Practices

Lieu et al. (2016) found that MSM reluctance to engage in HIV care is significantly associated with stigma and discrimination. Additionally, MSM experience suboptimal engagement in care due to fear of the possibility of encountering non-gay acquaintances in the hospital and other clinical settings (Liu et al., 2016). Obtaining a comprehensive understanding of how stigma and discriminatory practices related to HIV acquisition and transmission among MSM is a life-threatening public health challenge (Frye et al., 2015). Discriminatory experiences may increase HIV infection among MSM (Frye et al., 2015). Members of stigmatized groups encounter chronic stress and social discrimination associated with perceptions about their sexual orientation or gender identity (Frye et al., 2015). Minority MSM who experience race and sexual discrimination are at greater risk for HIV infection secondary to engagement in risky sexual behaviors, which may be related to depression and substance or alcohol use (Frye et al., 2015). Eaton et al. (2015) found that whether HIV+ or not, MSM experience stigma from health care providers that they felt were associated with their sexual orientation, medical mistrust and racism. In fact, healthcare-related stigma was significantly associated with prolonged delays in African American MSM receiving medical care and negatively influenced engagement in preventative services, health care access, and patient-provider communications (Eaton et al., 2015; Hightow-Weidman et al., 2017).

Fear of disclosure or being seen in an HIV-related health facility contributed to poor engagement in care (Ogunbajo, 2017). Young MSM delay or avoided HIV testing and engaging in HIV healthcare due to fear that medical providers may be judgmental about their sexual practices, reveal their HIV status or violate their right to privacy and share information about their sexual preferences with parents or other family members (Liu et al., 2016; Fisher, Fried, Macapagal & Mustanskic, 2016). MSM also delay or avoid engagement in care because of anxiety related to documentation that supports an HIV diagnosis and treatment, which may subsequently be connected to their medical record thus potentially influencing their eligibility for future health insurance coverage or fear that the information may be reported to governmental organizations (Liu et al, 2016).

Behaviors or Attitudes among Clinical Providers

Given the stigmatization and negative attitudes MSM experienced with clinical providers, within the U.S., disclosure rates ranged from 49% to 70% and serve as a barrier to engagement in HIV care (Qia, Zhou, & Li, 2018; Quinn et al, 2017). MSM disclosure plays a significant role in engagement in care and results in greater health-care utilization, a healthier perception of health status, and lower rates of depression (Qia et al., 2018). There is a positive association between sexual behavior/identity disclosure and engagement in the HIV care continuum (Qia et al., 2018; Quinn et al., 2017).

Medical mistrust negatively influences MSM disclosure and a clinical provider's ability to engage them and meet their medical needs (Eaton et al., 2017). The lack of trust in clinical providers may create concerns regarding violation of privacy, fear of being denied health care, and being stigmatized by the clinical provider (Quinn et al.,

2017). Quinn et al. (2018) found that among young African American MSM, regardless of the type of stigma experienced, there was a differential effect on their health and psychosocial outcomes, which suggested, HIV stigma has the potential to affect significantly viral suppression and medication adherence among this group.

Personal Factors

Age

Age is a biological social determinant of health that may influence the health outcomes of specific populations greater than others such as young MSM (Healthy People 2020, 2018a). Adolescents and young adults within the United States have poorer retention in care, a bigger delay in the initiation of ART, and poorer rates of viral suppression compared to older adults (Shaw & Amico, 2016). ART adherence is a significant challenge among young MSM secondary to their developmental state (McCarthy et al., 2018). Developmentally, young adulthood may be described as a stage whereby individuals experience less inhibition, a carefree demeanor and participate in risk-taking such as unprotected sexual activities, are spontaneous and do not engage in effective planning, and generally are not monitored as closely by their parents (Whiteley, Brown, Lally, Heck, & van den Berg, 2018). Young adults may feel like they are invulnerable; therefore, invincible to the consequences of their actions, which may explain the risk-taking and limit-testing behaviors seen during this developmental state (Whiteley et al., 2018). The aforementioned characteristics may contribute to lower rates of adherence to care among this age group, which may include engagement in HIV prevention strategies, the HIV continuum, and ART adherence (Whiteley et al., 2018).

Enhanced ART adherence resulting in sustained viral suppression within this population is vital to decreasing HIV transmission rates, poor health outcomes, increased hospitalizations and death (Hanna, Miller, Foster & Russell, 2014; Shaw & Amico, 2016; Lacey).

Ethnicity

Hussen, Harper, Bauermeister and Hightow-Weidman (2015) posited being young, African American, and gay may have an independent and interdependent relationship with the probability of suboptimal engagement at various stages of the HIV care continuum. Young HIV individuals are constantly at the highest risk for suboptimal and non-engagement in care at each stage of the continuum (Hussen et al., 2015)**.** Personal or individual factors contribute to this suboptimal engagement in care (Zhang et al., 2015). Personal factors may include psychological and psychosocial issues such as depression, negative self-image, substance or alcohol use, stress, medication side effects and feelings of compromised masculinity due to fear of pursuing health care (Zhang et al, 2015; Hussen et al., 2015). Other personal factors may include cognitive processes such as self-efficacy, motivational readiness, and optimism regarding the benefits of ART and social support (Gross et al., 2016). Hussen et al. (2015) found that MSM identity and ethnic identity were associated with adherence to health care appointments, while there was limited evidence supporting the role of HIV+ identity. Among young adults, specifically African American males, cognitive belief systems such as self-efficacy, motivational readiness, and decisional imbalance; psychological distress, which includes anxiety, suicidal ideation and depression; and substance and alcohol use were the most

reliable personal attributes meaningfully associated with a young adult's conduct regarding ART adherence (Gross et al., 2016).

Facilitators of Care

Facilitators to HIV care play a significant role throughout the HIV care continuum (Grau et al., 2017). Facilitators are strategies that encourage HIV+ individuals to engage in care to maximize the effectiveness of ART (Genberg et al., 2016). Consistent with barriers to HIV care, facilitators of care are multifaceted and may include social support, positive experience in a healthcare setting and rapport with personnel, health insurance, and an integrated model of care (Ogunbajo et al.; GDPH, 2017).

Social Support

Matsumoto et al. (2017) posited social support is a multidimensional concept that plays an essential role in positive health outcomes and well-being. There are four primary types of social support: (a) emotional support, which may include empathy and expressions of care and trust; (b) informational support such as advice, informational materials, and recommendations; (c) tangible support such as financial support or everyday hands-on assistance; and (d) positive social companionship, which may include friends, family, neighbors and disease-specific groups (Cook, Canidate, Ennis, & Cook, 2018; Matsumoto et al., 2017). According to Iacob et al. (2017), social and emotional support from HIV support groups is also essential in HIV care and ART adherence. Voisin et al. (2017) suggested young adults with a high amount of social support tend to have higher self-efficacy, which contributes to better motivational readiness for ART adherence. Voisin et al. (2017) also found when analyzing the association between

familial or friends support related to medication reminders and optimal ART adherence, there was not a relationship. However, a family's acceptance of the HIV diagnosis was associated with optimal adherence. Engagement in HIV specific support group events is also associated with higher rates of ART adherence than those who do not participate (Tumwikirize, Torpey, Adedokun, & Badru, 2015).

Among individuals with increased stress levels related to chronic health conditions similar to HIV/AIDS, social support promoted psychological changes while the perception of social support was associated with their physical and mental health (Tumwikirize et al., 2015). Despite the evidence supporting the value of support groups in ART adherence, the literature suggested, young HIV+ individuals do not participate in them due to stigma, fear of disclosure and lack of youth-friendly clinical services (; Iacob et al., 2017; Tumwikirize et al., 2015).

Integrated Model of Care and Specialty Care Integration

An integrated model of care allows individuals living with HIV/AIDS to be involved in all facets of their health care (GDPH, 2017). Establishing an integrated model fosters a framework that promotes cultural and linguistically appropriate services, which may improve efforts to address health care disparities (GDPH, 2017). Additionally, integrating primary care with specialty care such as mental/behavioral health care and HIV care has reduced patient wait times, enhanced coordination of care, and facilitated more efficient and comprehensive delivery of services (Bernard, Tailor, Jones & Alexander, 2016). Designing collaborative and integrated service is significant because according to the Institute of Medicine, due to the complexity of the health care

challenges associated with HIV/AIDS, a broad multidisciplinary approach is required (Bernard et al., 2016). Zhou et al. (2014) posited a patient-centered, one-stop model of care across diverse HIV care setting resulted in higher rates of HIV suppression for individuals taking ART for six months.

Positive Healthcare Setting and Rapport with Personnel

The availability of and access to comprehensive, quality health care is a vital determinant of optimal engagement in HIV care or medical services and ART adherence (Micheni et al., 2017). Access to comprehensive quality care includes access to easily accessible health care facilities that are resource-rich and has nonjudgmental personnel who possess attitudes that foster positive relationships among their patients (Micheni et al., 2017; Berger et al., 2015). Health care facilities that offer exceptional provider-patient communications, emphasized trust, respect, and HIV management knowledge facilitated increased rates of optimal engagement in care among African American MSM (Carey et al., 2018). Clinical providers who demonstrated compassion and respect towards African American MSM, as well as health care facilities that offered an array of services at one location and met the patients' needs contributed to greater engagement in care (Carey et al., 2018). Ogunbajo (2018) found establishing a rapport and familiarity with health care staff positively influenced engagement in care.

Viral Suppression

The advancement of research relative to the management of HIV turned what once was a deadly disease into a manageable chronic illness (WHO, 2017). Biomedical interventions such as ART medications generated this shift in the morbidity and mortality

of individuals infected with HIV (Lacey, Hanna, Miller, Foster & Russell, 2014). Daily use of ART reduces the amount of HIV in the blood within six months or less to amounts that are undetectable such that the health of the individuals living with HIV life is preserved, while also preventing transmission of the virus to someone who is not infected (National Institute of Allergy and Infectious Disease [NIAID], 2016). It is imperative that HIV+ individuals adhere to their ART regimen to ensure the virus is durably undetected, which suggest the virus is undetectable for six months after their initial undetectable test result (NIAID, 2016). Young HIV+ individuals are less likely among all age groups to be linked to care timely and to experience viral suppression (CDC, 2018c). Diverse behavioral factors contribute to suboptimal ART adherence between young HIV+ MSM and their timely engagement in the HIV continuum of care (Zanoni et al, 2014). Within the U.S., a large percentage of individuals who are HIV+ are lost to follow-up and care during each phase of the continuum (Kay et al., 2016). Young adults are susceptible to adherence problems secondary to their psychosocial and cognitive developmental stage (NIH, 2018c). Young MSM, especially AA MSM are particularly vulnerable to specific ART adherence challenges that contribute to them experiencing the lowest rates of viral suppression (Castel et al., 2016; Singh et al., 2014; Singh, Mitsch & Wu, 2017).

To mitigate this failure and to increase successful engagement in each phase of the HIV care continuum, strategies that target MSM at the individual-level must be developed (Kay et al., 2016). Medication adherence is a multidimensional phenomenon in chronic illnesses such as HIV/AIDS, especially in young adults (Adefolalu, 2018). Obtaining knowledge about behavioral factors that compromise health in young HIV+

MSM garners a greater understanding of health-enhancing behaviors, which may result in improved health outcomes (Adefolalu, 2018; Glanz et al., 2015). Behavioral skills obtained from supportive relationships or support groups may assist with the employment of effective relaxation skills that assist with issues relative to HIV disclosure or empowering MSM to discuss openly the barriers to ART adherence, which may subsequently result in improved treatment adherence and positive clinical outcomes (Adefolalu, 2018; Glanz et al., 2015).

Variable Definitions

Terms commonly used throughout the study were:

Acquired immune deficiency syndrome (AIDS): A collection of diverse infections or cancers that manifest in the body of an HIV+ individual whose has an extremely weak immune system suggesting the persons illness has progress to a more severe syndrome, which long-term may result in death (NIH, 2019).

Adherence: A process by which a proper treatment regimen is prescribed by a clinical provider after engaging in an appropriate conversation with the patient (Chakrabarti, 2014).

Age: Chronological number of years of being alive at the time of the interview (GDPH, 2015).

Antiretroviral therapy (ART): A term that refers to medications that are used to treat HIV infection, generally in a combination of three or more drugs (NIH, 2019).

ART Adherence: ART medication adherence refers to following a specific dose, set of pills, spoonful, or injections of ART medications according to a prescribed

schedule or special instructions. Adherence is measured by the participants use of health care services, which represents individuals who had at least three clusters of differentiation 4 (CD4) or HIV viral load testing documented in their medical record (Wortley & Drenzek, 2015).

CD4 Count: A test that measure the infection fighting cells within an individual's body (NIH, 2019). These cells are commonly referred to as helper cells because they are part of the white blood cells that help prevent infection (NIH, 2019). The CD4 count is indicative of the presence of HIV and the associated damage to the body, it is a reflection of a person's immunity status (NIH, 2019).

Educational Attainment: The highest level of education an individual has completed, defined as completing less than high school, receiving a high school diploma or GED and more than high school (NCES, 2018).

Engagement in Care: A term that refers to a traditional source for primary HIV health care (GDPH, 2015). HIV care is measured by participants use of health care services, which represents individuals who had at least three clusters of differentiation 4 (CD4) or HIV viral load test documented in their medical record (GDPH, 2015).

Ethnicity: A term that is synonymous with race and is subdivided as American Indian or Alaska Native, Asian, African American/African American, Hispanic or Latino, White and Multiple races (GDPH, 2015).

Health Insurance or other ART coverage: Health insurance and other ART coverage are terms used to categorize resources used to provide coverage for ART medications 12 months prior to being interviewed for the Medical Mentoring Project

(MMP). The ART coverage resources were categorized as private, public, unknown and other health insurance (GDPH, 2015).

Income: Combined yearly pay in U.S. dollars. Yearly incomes will be recoded from nine categories to three and will be represented as low, middle, and upper income levels. Low income will be reflected as (1) (less than 10,000 to 49,999), (2) middle income (50,999 to 299,999), and (3) upper income (300,000 to 499, 999). The recoded income value ranges are based on the Federal Poverty Guidelines, which identifies a household of four with incomes less than $25,100 per year as being low income (Office of the Assistant Secretary for Planning and Evaluation, 2018).

Men who have sex with men (MSM): Men who identified themselves as being homosexual, bisexual, or gay and who engage in a sexual encounter with one or more men 12 months prior to the MMP interview (GDPH, 2015).

Viral Load Suppression: Replication of the HIV virus within an individual's body is commonly referred to as viral load. Decrease replication results in reductions in the viral load or suppresses it to undetectable levels of HIV in the blood, which suggest the levels are not detectable via testing (NIH, 2019). ART plays a critical role in reducing HIV replication, suppression of the virus and HIV transmission (NIH, 2019).

Young adult: The universal definition for a young adult varied based on the resource utilized. The age range was from 18 to 24 years of age, 20 to 25 years of age and 18 to 39 years of age (Centers for Media and Child Health, 2018; Henderson & Egbert, 2015; McDonagh, 2018). For the purposes of this research study, young adults will consist of individuals 18 to 39 years of age.

Assumptions

The following assumptions where made after reviewing the MMP surveillance summary, as the information was not available for review. I assumed the data collection process was conducted in an ethical manner such that participants did not feel pressured or intimidated and that their right to privacy was not violated. Additionally, I assumed all participants volunteered to be included in the research study and that informed consent was obtained. Lastly, I assumed all participants were literate and responded with great integrity to the research questions.

Scope and Delimitations

In this study, I will identify factors that influence adherence to ART therapy among young MSM ages 18 to 39 who are HIV positive. The study will include data from the MMP Surveillance Summary for persons receiving HIV care in the State of Georgia from 2009 to 2013. The study is a cross-sectional, nationally recognized, complex sample survey designed to evaluate clinical and behavior qualities of HIV-infected adults receiving outpatient medical care in the United States and Puerto Rico. While there are many potential barriers to ART adherence among the target population, the focus of this study will be on the social determinants (age, ethnicity, income, educational attainment, ART insurance coverage), engagement in care and viral load suppression and their relative influences on ART adherence. While these influences among young adult MSM is the primary focus of the study, the findings may be relevant and applicable to other MSM populations across the United States and globally. The SCT

is the proposed theoretical framework that will support and direct the study because it has been used as an invaluable public health tool in health promotion, especially among youth and provides an essential foundation for understanding the development of human behavior (Glanz et al., 2015).

Significance

HIV is a major contributor to morbidity and mortality among young MSM (CDC, 2018a). MSM are the only group in all transmission classifications whose incidence of HIV infection increased (CDC, 2017). These young men are at an increased risk of HIV infection because often they engage in unprotected anal sex and do not use medications such as pre-exposure prophylaxis (PrEP) to protect themselves from HIV (NIH, 2018b). According to Lall et al. (2015), there is a pressing need for research to be conducted on factors influencing adherence to ART and retention in care among HIV+ adolescents and young adults from key populations such as MSM. The study findings could provide comprehensive knowledge about the relationship between factors that contribute to or adversely affect an HIV+ young adult's adherence to the ART treatment regimen such that effective strategies may be developed that decrease nonadherence. Gaining knowledge about factors that affect adherence could potentially lead to positive social change by promoting sustainable reductions in young HIV+ MSM nonadherence to ART as well as all HIV + youth under the age of 18. Further, implementing appropriate interventions shaped by the findings from this study may result in reduced HIV transmission rates and mortality among young HIV+ MSM. The results may ensure that

young HIV+ MSM of color with the highest incidence and mortality rates have increased awareness of the life-saving resources available to them.

These factors may include issues related to youth's lack of knowledge about the implications of them being HIV+ and their behavioral capability to adhere to ART as well as how determinants of health such as age, ethnicity, educational attainment, income, and ART insurance coverage influence ART adherence. These implications for social change are significant because nonadherence to ART compromises the efficacy of the existing medication regimen, limits optimization of future drug regimens in youth who develop multidrug-resistant HIV, increases the potential threat of transmitting the virus and death of youth (NIH, 2018).

Summary and Conclusion

Young adult African American MSM experience a disproportionate rate of newly diagnosed HIV with rates three to five times higher than other ethnic groups (CDC, 2018c; Voisin et al., 2017). They were also at the highest risk for ART nonadherence (CDC, 2017; Voisin et al., 2017). This is significant because ART is the gateway to epidemiological control for HIV infection; however, young adult HIV+ African American MSM are susceptible to poor adherence and viral suppression (Gross et al., 2017; Hornschuh et al., 2017; Voisin et al., 2017). Additionally, they have lower rates of retention throughout the HIV care continuum secondary to complex factors (Iacob et al., 2017; Zanoni et al., 2014).

Nonadherence among the target population is multifactorial; therefore, strategies to mitigate the increasing rates and improve treatment is necessary (Voisin et al., 2017).

ART is the most significant factor in obtaining optimal viral load suppression and a vital part of HIV prevention and treatment (Iacob et al., 2017; Voisin et al, 2017). Imminent efforts to initiate and sustain the target population in HIV care may be contingent upon close collaboration between the community-based organizations, HIV care facilities and staff, state and federal governments, and young African American MSM themselves. Working collaboratively among these groups may facilitate a more culturally and socially acceptable environment and comprehensive HIV health care system (Liu et al., 2016). Multilevel strategies that consist of individual, contextual and structural factors will be essential to achieving optimal engagement in the HIV continuum (Micheni et al, 2017). Consideration of these factors is highly encouraged when developing strategies, clinical practice, and policy research that aims to understand how these factors influence an individual' health behaviors (Khahana, 2016). Additionally, future research is needed to obtain a more comprehensive understanding of the collaborative relationship between mental health, substance usage, and how cognitive processes affect ART adherence (Gross et al., 2016).

Understanding the dynamics that result in suboptimal ART adherence is vital to the morbidity and mortality of this population and may lead to positive social change, as the findings could provide invaluable information about the relationship between factors that promote adherence or those that adversely affect ART adherence (Berger et al., 2015; Lall et al., 2015; NIH, 2018). In this regard, the intent of this study is to identify factors that influence adherence to ART therapy among young adult African American MSM who are HIV positive in the State of Georgia. A quantitative research study will be

conducted to investigate the relationship between the social determinants (age, ethnicity, income, and educational attainment), ART insurance coverage, engagement in care, viral load suppression and ART adherence amongst the study population based on the principles inherent in the SCT. The SCT was the theoretical concept selected because of its focus on the dynamic and the mutual interface between personal factors, behavior and the environment, which significantly influences ART adherence in young adults (Glanz et al., 2015). Section 2 will provide an overview of the methodology that was used to conduct this study.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative cross-sectional study was to identify factors that influence adherence to ART therapy among young MSM who are HIV+ in the state of Georgia. Considering that MSM are a key population with the highest rates of newly diagnosed HIV within the United States (CDC, 2018), the proposed research has the potential to fill a gap in the literature. The research will contribute to the literature because there is limited evidence of an association between factors that could influence young HIV+ MSM adherence to ART.

Section 2 will provide descriptions of the following information: Research design and rationale, methodology, population, sampling and sampling procedures. It will also provide a description of instrumentation and operationalization of constructs, and the data analysis plan. Lastly, section 2 will describe the potential threats to validity (internal, external, statistical, and construct), ethical processes, and a summary.

Research Design and Rationale

The quantitative research design was used to conduct this scientific investigation to if there was a relationship between the independent variables ART insurance coverage, engagement in care, and viral load suppression and the dependent variable ART adherence. The covariates that were investigated were age, ethnicity, income, and educational attainment. There were no mediating or moderating variables being investigated. Inferential statistical analysis is one of the primary analytical technics used in quantitative research and was appropriate for the study because this type of analysis

offers information about the variances and relationships between two or more samples of a population. Additionally, inferential statistical analysis permits hypothesis testing to occur and the results may be globally applied to the entire population. Statistical hypothesis testing is a process used to determine the probability that a specific hypothesis is true (Frankfort-Nachmias & Leon-Guerrero, 2015).

The cross-sectional study design was the specific type of quantitative analysis selected to conduct the study. The cross-sectional design addresses a fixed moment in time; therefore, it can only measure variances between diverse people, subjects, or phenomena instead of change (Salazar, Crosby, & DiClemente, 2015). Salazar et al. (2015) said cross-sectional studies allow researchers to make inferences based on current differences between populations such as HIV+ MSM. These differences may include factors such as an individual's socioeconomics, race/ethnicity, gender, and age.

Upon reviewing other quantitative research designs, it was determined that descriptive statistical analysis would not provide the comparative exploration required to answer research questions. Descriptive analysis involves summarizing and describing data features in a study such that patterns may be identified in a manner that makes the data easier to understand (Center for Innovation in Research and Teaching, [CIRT], n.d.). The descriptive methodology does not provide information relevant to the research question, as it does not provide a finding that supports the association between the various measures or inferences that extend beyond the data. Other research designs include experimental and quasi-experimental designs. Neither of the designs was an acceptable research approach for this study because the study is not experimental in

nature, as secondary data that is non-manipulative was used and participants were not randomly assigned to treatment groups to ascertain the impact of ART on young adult HIV+ MSM health outcomes. The cross-sectional design is the most appropriate research approach required to advance knowledge in the discipline, as it measures the association between the variables of interest.

Methodology

Population

The population of interest for the study is comprised of young adult HIV+ MSM between the ages of 18 and 39 receiving HIV care in the State of Georgia from 2009 to 2013. According to the Georgia Department of Public Health (2015), there were approximately 51,510 individuals in 2013 living within the state of Georgia diagnosed with HIV, and 2,661 were newly diagnosed with HIV. The target population consisted of 314 individuals who identified themselves as homosexual or gay and 227 individuals who fell within in the defined age range of 18 to 39 years.

Georgia Medical Monitoring Project (GMMP) and Medical Monitoring Project

The current dissertation study data are based on a secondary data analysis of the (MMP a surveillance system that collects local and national data to obtain knowledge about the experiences and needs of individuals living with HIV. The MMP data collection is performed through a collaboration between state and local health departments and the CDC (CDC, 2018). Data used to determine the affect social determinants has on ART adherence in the target population was obtained from the GMMP were used to conduct this study. All sampling was performed by the MMP and

data were collected by the state of Georgia. According to the CDC (2018), all 50 U.S. states, the District of Columbia, and Puerto Rico are eligible for participation in the MMP; however, only 16 states and one U.S. territory were selected. The number of state-based AIDS cases determined whether a site was selected for participation in the GMMP (CDC, 2018). The project period occurred 12 months prior to the interview unless otherwise noted.

Sampling and Sampling Procedure

The GMMP surveillance summary reported unweighted sample sizes and weighted incidence approximations with 95% confidence intervals for all behavioral and clinical characteristics within the project period (GDPH, 2015). Variables with less than five responses or a coefficient of variation of greater than or equal to 30 were not reported for weighted prevalence estimates or 95% confidence intervals. Weighting is significant because weighting allows adjustments to be made to account for unequal probabilities of selection during sampling and improves the precision of survey estimates (Pike, 2008). More specifically, weighting permits researchers to calculate estimations and make inferences about specific populations via a sample (Banerjee & Chaudhury, 2010). This sampling strategy was chosen because according to the CDC (2018), of all HIV+ individuals in medical care, 88% visited their HIV medical clinician at least once during the first 4 months of a calendar year. Sampling was conducted during two consecutive phases with the first stage of sampling being the state stage This stage of sampling occurs at outpatient health care facilities that provided HIV care The second personal stage consisted of HIV+ adults 18 years of age or older who engaged in one

medical visit to a participating facility from January 1 to April 30 of each project year (2009-2013). During the personal stage, 400 HIV+ individuals were selected from the National HIV Surveillance System. Upon being selected, individuals were asked to partake in interviews and answer questions about their HIV medical care and behaviors. Additionally, upon agreeing to participate in the study, the MMP staff obtained permission to review their medical records from outpatient healthcare facilities. Strict protocols were employed to ensure the confidentiality the patients and the participating healthcare facility. Participant and facility names were not shared with CDC or include in any reports.

According to the CDC (2018d), from 2005 to 2014, the MMP only included individuals receiving HIV medical care from HIV outpatient facilities; however, in 2015, the program began recruiting all adults diagnosed with HIV, including those who are not in HIV medical care.. Changing the sampling strategy allowed the research findings to guide policy and financial decisions as a means of increasing engagement in care and enhancing the quality of care HIV+ individuals residing in the U. S. received (CDC, 2018d).

Recruitment Procedures for Georgia Medical Monitoring Project (GMMP)

MMP personnel or the HIV medical facility personnel enrolled participants in the study using strategies that were contingent upon the health care facilities, project area needs, the local Institutional Review Board (IRB) requirements, and the number of participants (GDPH, 2015). For participants enrolled by MMP personnel, the HIV medical facility provided MMP personnel with the telephone numbers for everyone). For

those enrolled by the HIV medical facility clinicians, select participants were contacted via telephone, mail or in person communications and then by MMP personnel (Eligibility requirements included participants being diagnosed as HIV+, 18 years of age or older at the commencement of the PDP, no former participation in the MMP throughout the existing facts gathering cycle, and must have received health care at the sampled facility during the PDP (GDPH, 2015). Computer assisted individual interviews were used to capture participant responses. During the initial data collection for the original study all participants received approximately $50 in cash or the equivalent for their participation after the interview, MMP personnel used an electronic application provided by CDC to abstract participant-level data from their health care record (GDPH, 2015).

Obtaining GMMP Dataset for Dissertation Study

To gain access to the data set, I obtained approval of my research topic from the Walden University (WU) IRB 06-24-19-0549210). Upon obtaining approval from Walden University Research Office (WURO), I submitted a data request to the GDPH via their public health information portal. GDPH IRB approval was determined once the data request were received. No historical or legal documents were utilized as data sources.

A power analysis was completed to ascertain the smallest sample size suitable to detect the effect of a given test at the desired level of significance. More specifically, a G*Power priori analysis was completed to ascertain the appropriate sample size. A priori analysis is completed before a research study is conducted to ensure the projected sample size is sufficient to attain adequate power thus reducing the risk of underpower (Beck,

2013; Institute for Digital Research and Education, 2019). According to Aschengrau and Seage (2014), power is the ability of a test to reject properly the null hypothesis when the alternative hypothesis is true. To conduct this power analysis, secondary data will be utilized. Based on GMMP Surveillance Summary, between 20 and 38 health care facilities were sampled resulting in 400 participants from 2009 to 2013; however, in reviewing the number of participants who actually completed the interview and whose medical records were abstracted, there were 795 over the five-year review period .

Instrumentation and Operationalization of Constructs

The CDC developed the MMP research instrument in 2012 after the Adult/ Adolescent Spectrum of HIV Disease (ASD) and Supplement to HIV/AIDS Surveillance (SHAS) projects were found to be limited in their usefulness. (The instruments usefulness was inadequate because of their narrow geographical focus; the inability to approximate fundamental indicators, such as the quality of care provided and gaps in the availability of HIV health care services; and the inability to generalize the finding to the broader HIV population secondary to inappropriate sampling, as probability sampling was not conducted (CDC, 2012a). The MMP encompasses many of the features of the previous instruments; however, it was intended to collect nationally sampled population-based HIV surveillance data and to address the limitations inherent in the ASD and SHAS instruments (CDC, 2012a).

All data used by the state of Georgia in the GMMP were obtained from the national MMP data collection repository and disseminated intermittently to the state. Two questionnaires, one short (20 minutes) and one long (45 minutes) were used to conduct

the interviews. All interview questionnaires are available in English and Spanish and consisted of 10 distinct modules designed to provide a synopsis of the present-day epidemiology of HIV disease in the United States and Puerto Rico (CDC, 2012a; GDPH, 2015).

The Questionnaire Development System software applications used to conduct interviews has a built-in automatic checker that assures high-quality data is collected (CDC, 2012a). As an added level of assurance, the project coordinator or other supervisory personnel observed 5% of all interviews to ensure data completeness and quality. Additionally, episodic quality checks are conducted on the interviewers to ensure the techniques used to administer the questionnaire are the same (CDC, 2012a). As it relates to the medical record abstraction, the CDC provides training and has a call center to assist with any questions. Furthermore, for quality control purposes, 5% of medical records abstracted were re-abstracted by a second interviewer and then assessed for discrepancies and completeness (CDC, 2012a).

As it relates to the GMMP data, the research questions were examined because many of the questions asked using the survey instrument is related to and consistent with the information contained in the GMMP data. More specifically, the survey instrument is applicable to the research study and includes the selected variables such that hypotheses testing may be conducted to assess the probability of various associations. The survey questions were used among diverse HIV populations within the United States and were inclusive of the target population of this study. Permission to utilize the instrument is not required because it is located on CDC's website and other public domains (GDPH, 2015).

Table 1

Operationalization of Constructs

Variable	Definition	Measured by Survey Question Responses
ART Adherence	A term that refers to medications that are used to treat HIV infection, generally in a combination of three or more drugs (NIH, 2019) and the participants compliance with the medical providers prescription orders to include the correct dose, schedule and special instruction (GDPH, 2015).	Question 1 Do any of your ART medicines have special instructions, such as "take with food" or "on an empty stomach" or "with plenty of fluids"? If so, during the past 3 days, how often did you follow all of those special instructions? • Never • Rare • About half of the time • Most of the time • Always • Refused to answer Don't know (CDC, 2012b). Question 2 Most antiretroviral medicines need to be taken on a schedule, such as "2 times a day" or "3 times a day" or "every 8 hours." How closely did you follow your specific schedule during the past 3 days? • Never • Rarely

(*table continues*)

		• About half of the time • Most of the time • Always • Refused to answer • Don't know (CDC, 2012b). Question 3 When was the last time you missed any of your ART medicines? • Within the past week • 1-2 Weeks ago • 3-4 Weeks ago • 1-3 months ago • More than 3 months ago • Never skip medicines • Refused to answer • Don't know (CDC, 2012b).
Age	Chronological age at the time of the interview in years (GDPH, 2015)	Question 1 What is your date of birth? (CDC, 2012b).
ART Insurance Coverage	Health insurance and other ART coverage are terms used to categorize resources used to provide coverage for ART medications 12 months prior to being interviewed for the Medical Mentoring Project (MMP) (GDPH, 2015). The ART coverage resources were categorized as private, public, unknown	Question 1 During the past 12 months, have you had any kind of health insurance or health coverage? This includes Medicaid and Medicare. (CDC, 2012b). Question 2

(*table continues*)

	and other health insurance (GDPH, 2015).	During the past 12 months, what were all the kinds of health insurance or health coverage you had? • Private health insurance • Medicaid • Medicare • Ryan White • Tricare or CHAMPUS • Veterans Administration coverage • Other (Specify) • Refused to answer • Don't know (CDC, 2012b).
Educational Attainment	The highest level of education an individual has completed (may be defined as completing less than high school, receiving a high school diploma or GED and more than high school) (National Center for Educational Statistics, 2018).	Question 1 What is the highest level of education you completed? • Never attended school • Grades 1 through 8 • Grades 9 through 11 • Grade 12 or GED • Some college, associate's degree, or technical degree • Bachelor's degree • Any post graduate studies • Refused to answer • Don't know (CDC, 2012b).

(*table continues*)

Ethnicity	A term that is synonymous with race and is subdivided as American Indian or Alaska Native, Asian, African American/African American, Hispanic or Latino, White and Multiple races (GDPH, 2015).	Question 1 Which racial group or groups do you consider yourself to be in? You may choose more than one option. • American Indian or Alaska Native • Asian • African American or African American • Native Hawaiian or Other Pacific Islander • White • Refused to answer • Don't know (CDC, 2012b).
Income	Combined yearly household income in U.S. dollars (GDPH, 2015)	Question 1 In 2011(2012), what was your combined monthly or yearly household income from all sources before taxes? When I say combined household income, I mean the total amount of money from all people living in the household (CDC 2012b). Question 2 The interviewer then stated: Please take a look at Response Card A

(*table continues*)

		and tell me the letter that corresponds to either your monthly or yearly household income before taxes. (CDC, 2012b). Monthly Income a. $0 to $41 b. $417 to $833 c. $834 to $1249 d. $1250 to $1666 e. $1667 to $2499 f. $2500 to $3333. g. $3334 to $4166 h. $4167 to $6249 i. $6250 or more 77 Refused to answer 88 Don't know (CDC, 2012b). Yearly Income j. $0 to $4,999 k. $5,000 to $9,999 l. $10,000 to $14,999 m. $15,000 to $19,999 n. $20,000 to $29,999 o. $30,000 to $39,9993334 p. $40,000 to $49,999 q. $50,000 to $74,999 r. $75,000 or more 77 Refused to answer 88 Don't know (CDC, 2012b)
Engagement in Care	A term that refers to a traditional source for primary HIV health care (GDPH, 2015). HIV care is measured by participants use of health care services, which represents individuals who had at least three clusters of	Question 1 During the past 12 months, have you been to any other doctor's office or clinic for your HIV medical care? (CDC, 2012b).

(*table continues*)

	differentiation 4 (CD4) or HIV viral load assessment documented in their health record (GDPH, 2015).	
Viral Suppression	Replication of the HIV virus within an individual's body is commonly referred to as the viral load. Decrease replication results in reductions in the viral load or suppresses it to undetectable levels of HIV in the blood, which suggest the levels are not detectable via testing (NIH, 2019).	Question 1 What was the result of your most recent viral load test? • Below the level of detection, undetectable • Detectable but less than 5,000 viral copies/ml • 25,000 to 100,000 viral copies/ml Greater than 100,000 viral copies/ml Refused to answer • Don't know (CDC, 2012b) Question 2 During the past 12 months, how many viral load tests have you had? (CDC, 2012b). Information regarding the variable/scale score was not available in the data summary

Source: Wortley & Drenzek, 2015

Data Analysis Plan

Engagement in care and viral suppression are the independent variables, ART adherence the dependent variable and the social determinates (age, educational attainment, ethnicity, and income and ART insurance coverage) are the covariates. Steiner (2015) said, covariates may influence the research outcomes; therefore, it is important to include them in statistical analyses. Covariates assist with the explanation of the research findings and increase the accuracy of the results and the power of the statistical test (Steiner, 2015). Inferential statistical tests that might be used to test the hypothesis includes correlations, regression and analysis of variance. The actual statistical analysis conducted will be contingent upon how the variables are measured (Frankfort-Nachmias & Leon Guerrero, 2015). The levels of measurement may be nominal, ordinal, interval, or ratio (Marateb, Mansourian, & Farina, 2014).

SPSS software was used to conduct the statistical analysis and the outcomes directed how the results were interpreted. Analytical results were interpreted as reject or fail to reject the respective research hypothesis established at the beginning of the study. A p-value or alpha of 0.05 were used as the level of significance. If the p-value is greater than or equal to 0.05, we failed to reject the null hypothesis and if the p-value is less than or equal to 0.05 we reject the null hypothesis. The confidence interval is the measure of uncertainty around the primary result of statistical analysis (Fink, 2013). The confidence intervals and significance level work collaboratively to describe research finding because it is statistically better to use the P-value and confidence intervals instead of the P-value and hypothesis testing (Fink, 2013; Dahiru, 2008).

Data were prepared to ensure that there were no missing values and that all data were valid (Devi & Kalia, 2015). Missing and inaccurate data may result in significant problems related to the reliability and validity of the research conclusions (Devi & Kalia, 2015). Absent data may reduce statistical power, create bias in the estimate of parameters, decrease the representativeness of the population samples and increase the complexity of analysis, which threatens the validity of the research conclusions (Kang, 2013).

The following research questions were addressed:

RQ1: Is there a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

H_01: There is no relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_01: There is a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ2: Is there an association between age, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

H_02: There is no association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_a2: There is an association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ3: Is there is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV + MSM between the ages of 18 and 39 in Georgia?

$H_0$3: There is no relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_a3: There is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

Threats to Validity

Data preparation plays an important role in research, as does data reliability. Reliability is the extent to which research can trust the source of the data (Burkholder, Cox & Crawford, 2016). Reliable data is dependable, constant and trustworthy and can produce consistent results (Burkholder et al., 2016). For research data to be valuable and useful, it must be both reliable and valid. Validity in quantitative research is an indication that research accurately measures what it was projected to measure and serves as the central quality indicator (Burkholder et al., 2016; Creswell, 2013). There are several distinct threats to validity that may negatively affect the research finding to

include the internal, external, statistical conclusion, and construct validity (Creswell, 2013). Internal validity refers to the truth of inferences in research, as it relates to the cause and effect relationship (Creswell, 2013). Threats to internal validity occur when investigators use investigational steps, treatments or participant practices that threaten the researcher's capacity to extrapolate accurate data about the target population (Creswell, 2013). Threats to internal validity may include issues such as selection bias, statistical regression, maturation, treatments and instrumentation (Creswell, 2013). This research study will include the use of secondary data; rather than that obtained from experimental research. In this regard, threats to internal validity should be less likely to occur or will be minimal (Creswell, 2013).

External validity refers to the capacity of research finding to be generalized to and across settings, individuals and times (Burkholder et al., 2016). Threats to external validity may occur when research findings are generalized to groups not included in the study or to the results of historical or prospective situations (Creswell, 2013). According to Burkholder et al. (2016), utilizing the findings from secondary research such as that used in this study decreases the threat to external validity as well as conducting a comprehensive literature review.

Statistical conclusion validity refers to inferences made about the association between two variables based on the accuracy of statistical testing results (Burkholder et al., 2016). Threats to statistical conclusion validity occur when researchers inaccurately draw conclusions secondary to low statistical power or violations of statistical assumptions (Creswell, 2013). Data cleaning and outlier analysis are threats to this type

of validity as well. The sampling process for the GMMP included a random selection of participants, occurred at diverse HIV health care settings and all recruitment procedures were clearly described; therefore, in this regard, there are no anticipated statistical conclusion threats to validity. However, in lieu of the fact that diverse statistical testing will be conducted to answer the proposed research questions, there is a potential threat to statistical conclusion validity related to inadequate statistical power and violations of statistical assumption (Creswell, 2013).

Construct validity is the degree in which research concepts are conceptualized and operationalized in a study (Burkholder et al., 2016). Threats to construct validity occurs when researchers do not properly define or measure variables (Creswell, 2013). While all variables were defined, the variable measurements are unknown at this time and will not be available until the actual data is obtained from the State of Georgia. Although the data measurements are not available, I do not anticipate any threats to construct validity. Additionally, secondary data analyses have the potential to increase the overall efficiency of the research effort and support the basis for confidence in the validity of the analysis (Cheng & Phillips, 2014).

Ethical Procedures

A formal request to WUIRB was completed to obtain the GMMP dataset. Only secondary data obtained from the GDPH was utilized in the study; therefore, I did not have any contact with human subjects. The GDPH required that an approved IRB form be submitted with the formal request for data. I completed a request and obtained IRB approval from the GDPH.

The State of Georgia and CDC abstracted the data contained in the GMMP from the MMP; therefore, the data remained anonymous, confidential, and impossible to identify the participants. According to the CDC (2018d), strict protocols were established to protect the confidentiality of participants. The patient names and healthcare facilities were kept confidential and were not shared with CDC or included in any reporting (CDC, 2018d). Informed consent was obtained from all participants prior to them partaking in the MMP. Additionally, MMP personnel (interviewers, data managers, and medical record abstractors) were required to participate in a security and confidentiality training consistent with that obtained by health department personnel who perform HIV/AIDS surveillance (CDC, 2012a). All software developers participating in the surveillance data collection for all HIV/AIDS projects must adhere to the Public Health Service Act's Assurance of Confidentiality (Sections 306 and 308(d)). This law asserted data obtained via a surveillance system that may allow for the identification of an individual or that established all information collected will be maintained with strict confidence, only used for the reasons stated and would not be revealed or released without proper consent (CDC, 2012a).

The CDC (2012a) determined that MMP was not experimental research; rather it is a disease investigation initiative designed to use the data for disease control and policy development. Since MMP is not considered to be research, it was not subjected to the regulations applicable to human subjects inclusive of federal IRB evaluation and endorsement. Although human subjects were not involved in the data collection, all federal, state, and local MMP personnel were required to adhere to the ethical principles

and standards, expected to respect and protect the privacy/confidentiality, and autonomy of participants to the maximum level imaginable, thus ensuring there were no ethical concerns related to the recruitment or data collection process (CDC, 2012a). According to the GMMP (2015), there were no other ethical concerns indicated such as participant deception, potential power imbalances or exploitation of participants (Creswell, 2013).

Summary

A quantitative cross-sectional study was proposed to identify factors that influence adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia. The proposed dataset focuses on the behavior and clinical characteristics of persons receiving HIV care in the state of Georgia from 2009 to 2013. Inferential statistical analysis is the primary statistical technique that will be used to determine the relationship between the variables and permits hypothesis testing to occur such that the results may be generalized to the entire population. The research design and rationale for its use were discussed as well as the methodology, target population, sampling and sampling procedures, as described in the original MMP survey, instrumentation and operationalization of SCT constructs, data analysis plan, threats to validity and ethical concerns. Section 3 will detail the actual research results and findings obtained from the data analysis.

Section 3: Presentation of the Results and Findings Section

Introduction

The purpose of this quantitative cross-sectional study was to investigate the relationship between factors that influence ART adherence, which include social

determinants (age, ethnicity, educational attainment, income, and ART insurance coverage), engagement in care, and viral load suppression and ART adherence among young adult MSM who are HIV+ between the ages of 18 and 39 in the state of Georgia. The research questions and hypotheses were:

RQ1: Is there a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

$H_0 1$*:* There is no relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

$H_0 1$*:* There is a relationship between awareness about ART and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ2: Is there an association between age, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia?

$H_0 2$*:* There is no association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

$H_a 2$*:* There is an association between age, gender, ethnicity, educational attainment, income, and ART insurance coverage and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

RQ3: Is there is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV + MSM between the ages of 18 and 39 in Georgia?

H_03: There is no relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

H_a3: There is a relationship between engagement in care, viral load suppression, and adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia.

Section 3 details the data collection process for the secondary data, as well as actual research results and findings obtained from the data analysis and a summary. The initial analysis conducted involved descriptive statistics, which included a frequency table inclusive of participant response percentages for each variable within in the study. Descriptive statistical analysis was followed by chi square and logistical regression analyses.

Data Collection of Secondary Data Set

The GDPH MMP secondary data was used to answer the research questions guiding the current study. According to the GDPH (2015), the data collection time frame for the original study was January 1 through April 30 during the project period 2009 to 2013. The aforementioned project period occurred 12 months prior to the interview unless otherwise noted. MMP personnel or the HIV medical facility personnel recruited and enrolled participants in the MMP study. A trained interviewer used a computer to capture all responses during confidential individual interviews. Four hundred participants were sampled annually from 28 to 38 of the sampled facilities. Over the 5-year project period, 795 participants finished the questionnaire, their medical records

were abstracted and used in the research study. The facilities sampled response rates varied by year and ranged from 45% to 75% as did the participant response rates; however, the participant response rates were much lower and ranged from 31% to 48% during the project period.

An advantage of using a secondary data set is that the data were already collected and available for use as evident in the GMMP data summary used during the planning stages of this study. Despite the availability of the data, information related to awareness was not presented in a manner conducive to the research study. There were four survey items that covered topics related to prevention education and awareness, as outlined below. The interview questions were as follows:

1. During the past 12 months, have you seen or received any informational/educational materials such as posters, leaflets, pamphlets, or videos that tell you how to protect you or your partners from HIV or other STDs?
2. Have you talked to a counselor about HIV prevention?
3. Have you had a one-on-one conversation with a doctor, nurse, or other healthcare worker about ways to protect yourself or your partners from getting HIV or other sexually transmitted diseases? and
4. Have you participated in an organized session involving a small group of people to discuss ways to protect yourself or your partners from getting HIV or other sexually transmitted diseases?

The four variables were recorded by combining them into one awareness variable. This was accomplished by assigning a value of Yes if the study participant's responses to at least one of the questions were Yes. To focus the relationship being studied to those who were adherent or not, only the cases where a value of Yes, person is 100% adherent or No, person is not 100% adherent" were used. Any cases with missing values or values of NA, incomplete data, or not known were not selected. The original study variables with the associated categories are displayed in Table 2 (Original Variables) and the recoded variables are in Table 3 (Recoded Variables).

Table 2

Original Variables

Variable Name	Definitions	Variable Type
1. During the past 12 months, have you seen or received any informational/educational materials such as posters, leaflets, pamphlets, or videos that tell you how to protect you or your partners from HIV or other STDs?	Prevention services received during 12 months before the interview	Categorical
2. Talked to counselor about HIV prevention.	Prevention services received during 12 months before the interview	Categorical
3. Have you had a one-on-one conversation with a doctor, nurse, or other health care worker about ways to protect yourself or your partners from getting HIV or other?	Prevention services received during 12 months before the interview	Categorical

4. Have you participated in an organized session involving a small group of people to discuss ways to protect yourself or your partners from getting HIV or other sexually transmitted diseases?	Prevention services received during 12 months before the interview	Categorical

(*table continues*)

Source: Wortley & Drenzek, 2015

Table 3

Recoded Prevention Values: Awareness of Importance of ART Adherence

1	Aware
2	Not Aware

Source: Wortley & Drenzek, 2015

There were 97 (52.7%) missing responses in the first question related to awareness. It is important to manage missing data to reduce bias and draw valid assumptions about the target population (Langkamp, Lehman, & Lemeshow, 2010). Additionally, it is significant that researchers handle missing values first when recoding variables to prevent recoding errors. This type of error occurs when researchers fail to tell SPSS explicitly what to do with missing values (Kent University, 2017). If SPSS is not directed on how to handle missing values, the system may recode missing values into one of the new valid categories (Kent University, 2017).

While SPSS handles missing numeric data by omitting the missing values automatically and excluding them from calculations, imputation is another method that

may be used to address missing data (University of California Los Angeles Institute of Digital Research and Education [UIDRE], 2016; Khang, 2013). Imputation is the process of replacing missing data with an estimated value (Khang, 2013). To evaluate the outcome of imputation on the recoded awareness variable, all missing data among the four awareness variables, were replaced or imputed with No, the overall awareness variable was recalculated, and the Chi Squares rerun.

According to the GDPH (2015), unweighted sample sizes and weighted incidence approximations with 95% confidence intervals for all characteristics within the project period were reported. Variables with less than five responses or a coefficient of variation of greater than or equal to 30 were not reported for weighted prevalence estimates or 95% confidence intervals (GDPH, 2015). Weighting is significant because it is a correction technique utilized by researchers to compensate for the bias relative to effects of survey non-respondents (Pike, 2008).

There was a discrepancy in the information received from the GDPH. The secondary data set did not include one of the variables presented in Section 2. Specifically, the data set did not include the variable that was proposed to serve as a proxy for engagement in care. The variable was from Table 8 of the GDPH Medical Monitoring Project surveillance summary (Clinical services provided during the 12 months before the interview, has a place for primary HIV care). In this regard, data required to answer the third proposed research question is unavailable for analysis. In addition to this discrepancy, the data set included four variables that supported prevention

services (proxy for awareness) instead of three that were presented in the MMP data summary and questionnaire.

From 2009 to 2013, 2,000 adults aged 18 or older who received HIV medical care in an outpatient facility within the State of Georgia were surveyed for participation in the MMP. Table 4 provides an overview of the description of that sample, which includes the descriptive statics and demographic features. The final analytic sample consisted of 184 males who identified themselves as homosexual or gay.

Descriptive Analysis

Of the 184 study participants, 132 (71.7 %) were Black or African American, 26 (14.1%) White, and 26 (14.1 %) other. With respect to age, 119 (64.7%) were age 30 to 39 and 42 (22.8%) were age 25-29. The majority 88 (47.8%) of the population had some college, an associates or technical degree and 44 (23.9%) completed grade 12 or a Graduate Educational Development certificate (GED). A little over half 97 (52.7 %) had annual incomes less than $19,999 and 49 (22.6%) had incomes that ranged from $20,000 to $39,999. Approximately 100 (54.3%) had health insurance that covered ART medications. One hundred thirty-nine or 73.9% of the population were 100% adherent to their ART medication dose, 90 (48.9%) were 100% adherent to their ART medication instructions and 126 (68.5%) were 100% adherent to the ART medication schedule. Sixty-eight or 37% of population were aware of the importance of ART adherence and 97 (52.7%) were missing data, which served as a limitation.

The descriptive analysis revealed that the data sample is not representative of the population of interest, as 71.7% of the participants were African American. The target

population was young HIV + MSM age 18-39 in Georgia. Since the data used is secondary, the method for selection cannot be altered to account for the increased number of African Americans in the sample size. Additionally, as previously stated the data distribution among race/ethnic groups were changed by the GDPH to safeguard the participant's right to privacy. Samples without representativeness of the target population do not allow statistical inferences to be made because they are not a reliable source in which conclusions may be drawn about the reference population; therefore, a limitation of the study. The GMMP study included geographically stratified random sampling methods in which selection probabilities were utilized, sampling frame and lastly participants were selected based on equal probability sampling methods (CDC, 2012). Stratified random sampling permits researchers to obtain a sample population that is representative of the total population being studied, improves accuracy and in general is a more truthful depiction of the population than simple random sampling (University of Central Arkansas, 2013; Salkind, 2012).

Table 4

Frequencies of Study Variables

Demographic	*n* = 184	%
Combined gender and sex at birth		
Male	184	100.0
Race/Ethnicity		
White, non-Hispanic	26	14.1
Black, non-Hispanic	132	71.7

Other	26	14.1
Age groups at interview date		(*table continues*)
18-24	23	12.5
25-29	24	22.8
30-34	51	27.7
35-39	68	37.0
Highest level of education		
Grade 1 through 11	15	9.2
Grade 12 or GED	44	23.9
Some college, associate's degree, or technical degree	88	47.8
Bachelor's degree or higher	37	20.1
Yearly income		
$0 to $19,999	97	
$20,000 to $39,999	49	
>=$40,000	32	
Don't know	6	
Had any health insurance or ART medicines (ARVs) were paid by any health insurance in the P12M		
Yes, did have this type of ins.	100	
Uninsured	13	
Uninsured (RW/ADAP only)	71	

Source: Wortley & Drenzek, 2015

Table 5

Frequencies of Awareness

Variable	*n* = 184	%
Aware	68	37.0
Not Aware	19	10.3
Missing System	97	52.7

Source: Wortley & Drenzek, 2015

Table 6

Frequencies of Adherences When Taking ART Medicine

Variable	*n* = 184	%
Dose Adherence		
Yes, person is 100% adherent	136	73.9
No, person is not 100% adherent	25	13.6
NA--Not taking ART	21	11.4
Incomplete Data Available	2	1.1
Schedule Adherence		
Yes, person is 100% adherent	90	48.9
No, person is not 100% adherent	40	21.7
NA--Not taking ART	21	11.4
NA--No special instruction needed	31	16.8
Instruction Adherence		
Yes, person is 100% adherent	126	68.5
No, person is not 100% adherent	37	20.1
NA--Not taking ART	21	11.4
Yes, person is 100% adherent	126	68.5

Source: Wortley & Drenzek, 2015

Study Results

To investigate the relationship between ART awareness and ART adherence by dose, instruction and schedule, a series of chi-square analysis were conducted. Chi-square was the statistical tool selected to conduct this analysis because it determines whether there is an association between categorical variables such as ART awareness and adherence; however, does not make inferences about causation (McHugh, 2013). As a nonparametric statistical test, data used to conduct the chi-square is not required to be drawn for a normal distribution and the data are assumed to be random (Frankfort-Nachmias & Leon-Guerrero, 2015). Further, conclusions drawn for chi-square are considered to be reliable if there is independence of observation and all expected frequencies are greater than five (McHugh, 2013). If the cell frequencies are less than five, SPSS will automatically display this as an error at the bottom of the chi-square test table. SPSS automatically tested for these assumptions; therefore, no additional testing was required (Kent State University. 2019).

To predict the association between age, gender, ethnicity, educational attainment, income and ART insurance coverage and ART adherence, a series of binomial logistical regressions were conducted. Binomial logistic regression was chosen as the statistical tool to conduct this analysis because it is a predictive analysis, measures associations and controls for effect of confounding variables (Stolzfus, 2011). Additionally, logistic regression is an efficient and powerful method that researchers may use to analyze the effect of a group of independent variables on a binary outcome such as ART adherence by quantifying each of the social determinant's unique contributions (Stolzful, 2011).

Logistic regression requires a categorical variable as the dependent variable, allows categorical variables as independent variables, and requires there is independence of observation (Stolzful, 2011). All other assumptions are not applicable to the variables contained within this data set, as they are not continuous variables (Stolzful, 2011).

Chi-Square Analysis

As it relates to the chi square analysis of awareness and ART medication dose adherence, the p-value of .572 is greater than the alpha of .05; therefore, I failed to reject the null hypothesis that awareness about HIV and the significance of taking ART medications is not associated with medication dose adherence (McHuge, 2013). The final analytical sample consisted of 80 observations. The chi-square analysis with 95% confidence revealed a Person's Chi-Square value $X^2(1) = .319$, df = 1, p = .572. There was not a statistically significant difference between awareness and dose adherence, which suggest there is not sufficient evidence to support there is an association. To review the chi-square results for awareness and dose adherence from the SPSS output (see Appendix A1).

The chi square analysis of ART medication instruction adherence, the p-value of .024 is less than the alpha of .05; therefore, I rejected the null hypothesis that awareness about HIV and the significance of taking ART medications are not associated with medication instruction adherence. The final analytical sample consisted of 59 observations. The chi-square analysis with 95% confidence revealed a Person's Chi-Square value $X^2(1) = 5.089$, df = 1, p = .024. There was a statistically significant difference between awareness and instruction adherence, which suggest there is sufficient

evidence to support there is an association. To review the chi-square results for awareness and instruction adherence from the SPSS output (see Appendix A2).

To assess the strength of the association between awareness and instruction adherence, a gamma test was conducted. This specific test was used because both variables are dichotomous and may be considered ordinal (Frankfort-Nachmias & Leon Guerrero, 2015). A gamma value may range from 0.0 to $\pm$ 1.0 and provides information that is indicative of the strength and direction of the association between the variables (Frankfort-Nachmias & Leon Guerrero, 2015). There was a strong, positive association between awareness and medication instruction adherence, as the Gamma yielded a value of .674 ($p = .048$).

In the instance of awareness and ART medication schedule adherence, the p-value of .083 is greater than the alpha of .05; therefore, I failed to reject the null hypothesis that awareness about HIV and the significance of taking ART medications is not associated with medication scheduling adherence. The final analytic sample consisted of 80 observations. The chi-square analysis with 95% confidence revealed a Person's Chi-Square value $X^2(1) = 3.013$, $df = 1$, $p = .083$. There was not a statistically significant difference between awareness and schedule adherence, which suggest there is not sufficient evidence to support there is an association. To review the chi-square results for awareness and schedule adherence from the SPSS output (see Appendix A3).

Regression Analysis

The final analytic sample consisted of 161 observations without missing variables. Binomial Logistic Regression was used to investigate the association between

age, race, educational level, and the availability of health insurance for ART medications to predict medication dose adherence. The logistic regression with 95% confidence yielded that the social determinates (age, race/ethnicity, educational level and health insurance coverage) were not statistically significant in predicting dose adherence. More specifically, the level of significance was as follows: age (p =.208), race/ethnicity (p =.760), educational level (p = .194) and health insurance coverage (p = .190). Since the aforementioned p-values were greater than alpha .05, we fail to reject the null hypothesis that age, race, educational level and the availability of health insurance for ART medications is not associated with predicting medication dose adherence. In lieu of a lack of statistical significance in predicting dose adherence, no additional testing was conducted. The Binomial Logistic Regression Likelihood Ratio test results for age, race, educational level and health insurance predicting medication dose adherence are displayed in Table 7.

Table 7

Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	70.675	.000	0	.
Age groups at interview date	75.220	4.545	3	.208

(*table continues*)

Race/Ethnicity	71.224	.549	2	.760
Highest level of education	75.392	4.718	3	.194
Had any health insurance or ART medicines (ARVs) were paid by any health insurance in the P12M	73.994	3.319	2	.190

Source: Wortley & Drenzek, 2015

The final analytic sample consisted of 130 observations with no missing variables. Binomial Logistic Regression was used to investigate the association between age, race, educational level, and the availability of health insurance for ART medications to predict medication instruction adherence. The logistic regression with 95% confidence yielded that race/ethnicity ($p = .039$) and educational level ($p = .28$) were statistically significant predictors of medication instruction adherence. The Cox and Snell Pseudo R-Square test was calculated and yielded that the model explains 11.7% of the variance in the dependent or response variable (Menard, 2010). Further analysis of the regression model revealed that White Non-Hispanic persons ($y = 1$, $p < .029$) had an (Odd ratio [OR] = .168), which reflected a higher likelihood of adhering to instructions than persons of other races/ethnicities, Black ($y = 2$, $p = .473$), other ($y = 9$, no value). In addition, persons with educational levels from grades 1 through 11 (Highest level of education = 3, $p = .048$, OR = .189) and persons with some college, associate degree, or technical degree (Highest level of education = 5, $p = .028$) had an (OR = .245), which reflected a higher likelihood of adhering to instructions than persons with other educational levels. The odds ratio measures the relationship between an exposure and an outcome and may

be used to determine if a specific treatment is considered a 'risk factor' for a specific outcome (Szumilas, 2010). An OR equal to one suggest an exposure does not influence the odds of an outcome. While an OR greater than one suggests an exposure is associated with a higher odds of an outcome compared to an OR less than one, which suggest an exposure is associated with a lower odds of an outcome. To review the Binomial Logistic Regression results for age, race, educational level and health insurance predicting medication instruction adherence (see Appendix B1) and for the Cox and Snell Pseudo R-Square (see Appendix B2).

The final analytic sample consisted of 163 observations with no missing variables. Binomial logistic regression was used to investigate the association between age, race, educational attainment, and the availability of health insurance for ART medications to predict medication schedule adherence. The logistic regression with 95% confidence yielded that educational attainment was a statistically significant predictor of medication schedule adherence ($p = .002$). The Cox and Snell Pseudo R-Square test yielded that the model explained 16.8% of the variance in the dependent variable. Further analysis of the regression model revealed that persons with educational attainment levels from grades 1 through 11 (highest level of education = 3, $p = .000$, OR =1.056) and persons in grade 12 and those with a GED (highest level of education = 4, $p = .000$, OR = 1.363), which reflected a higher likelihood of adhering to the medication schedule. To review the logistic regression results for age, race, educational level and health insurance predicting medication schedule adherence (see Appendix B3) and for the Cox and Snell Pseudo R-Square test (see Appendix B4).

Summary

In Section 3, I investigated the relationship between ART awareness and ART adherence by dose, instruction and schedule among young HIV+ MSM age 18-39 in Georgia. The association between age, gender, ethnicity, educational attainment, income and ART insurance coverage and ART adherence were also investigated. Seven hundred and ninety-five MSM participants finished the questionnaire and their medical records were abstracted for use in the research study. Although 795 participants were recruited, only 184 of those participants identified themselves and being MSM and age 18 to 39. Data obtained from the GMMP were analyzed using chi-square and binomial logistic regression. The results of each statistical analysis were utilized to answer two of the three proposed research questions and the hypothesis. RQ3 was not investigated because the dataset did not contain the appropriate variables.

Chi-square analysis was used to answer RQ1. The recoded ART awareness variables were used to conduct the chi-square statistical analysis. The dependent variable, ART adherence varied based on dose, instruction, and schedule medication adherence. The chi-square analysis for awareness about ART based on dose medication adherence revealed a Pearson chi-square value of $\chi 2$ (1) = .319, with p = .572. This suggested there were no significant differences in terms of medication dose adherence based on awareness. The chi-square analysis for awareness based on medication instruction adherence revealed a Pearson chi-square value $\chi 2$ (1) = 5.089, p= .024. This suggested there was a significant difference in medication instruction adherence based on awareness. The Gamma test of association revealed a value of .674, suggesting there was

a strong positive relationship between medication instruction adherence and awareness. The chi-square analysis for awareness based on medication schedule adherence revealed a Pearson chi-square value $\chi 2$ (1) = 3.013, p = .083. This suggested there was no significant difference in medication dose adherence based on awareness. There was no relationship between ART awareness based on ART medication dose and schedule among young HIV+ MSM between the ages of 18 and 39 in Georgia. However, there was a statistically significant relationship between ART awareness based on ART medication instruction among young HIV+ MSM age 18-39 in Georgia.

Binomial logistic regression analysis was used to answer RQ2. The independent variables were social determinants (age, ethnicity, educational attainment, income, and ART insurance coverage). The dependent variable, ART adherence varied based on dose, instruction, and schedule medication adherence. A regression analysis for predicting medication dose adherence based on social determinants revealed that the variables were not statistically significantly related. The regression analysis for predicting medication instruction adherence based on the social determinants revealed that race/ethnicity (p=.039) and educational attainment (p = .028) were statistically significant predictors of medication instruction adherence. The Cox and Snell Pseudo R-Square revealed that the model explained 11.7% of the variance in the dependent variable. The social determines of age, insurance coverage were not statistically significant for predicting ART medication instruction adherence. Additionally, the model revealed that Whites had a higher likelihood of adhering to medications instructions than other races/ethnicities. Individuals with education attainment levels consistent with grades 1 through 11 and

those with some college, an associate's or technical degree had a higher likelihood of adhering to ART medication instructions than other educational attainment levels. The regression analysis for predicting medication schedule adherence based on the social determinants revealed that educational attainment ($p = .002$) was a statically significant predictor of medication schedule adherence. The Cox and Snell Pseudo R-Square revealed that the model explains 16.8 % of the variance in the dependent variable. Individuals with education attainment levels consistent with grades 1 through 12 had a higher likelihood of adhering to ART medication schedule.

A summation of the binomial logistic regression model revealed that there was not a statistically significant relationship between the social determinants for ART medication dose adherence. Additionally, there was not a statistically significant relationship between age, income, and ART insurance coverage and adherence to ART medications based on ART medication instruction adherence among young HIV+ MSM age 18-39 in Georgia. However, there was a statistically significant relationship between educational attainment and ART medication instruction and schedule adherence to ART among young HIV+ MSM age 18-39 in Georgia. There was also a statistically significant relationship between race/ethnicity and ART medication instruction adherence among young HIV+ MSM age 18-39 in Georgia. White non-Hispanics had a higher likelihood of adhering to medication instructions than other races/ethnicities. Persons with educational levels from grades 1 through 11 and persons with some college, an associate's degree or technical degrees had higher likelihood of adhering to medication instructions than persons with other educational levels.

Section 4 will reintroduce the study by restating the purpose and nature of the study. Additionally, it will provide the rationale for why the research was conducted. Section 4 will also include information about the interpretation of the findings, limitations of the study, implications for professional practice, and social change.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative cross-sectional study was to investigate the relationship between factors that influence ART adherence, which include social determinants (age, ethnicity, educational attainment, income, and ART insurance coverage), engagement in care, and viral load suppression among young adult MSM with HIV who are between the ages of 18 and 39 in the state of Georgia. Young adults, especially AA MSM have the lowest rates of ART adherence among all age groups; however, individuals between the ages of 13 and 24 experience greater than 50% of all new HIV infections, and have HIV rates that are three to five times higher than other ethnic groups (Voisin et al., 2017). Despite the availability of biomedical interventions such as ART, young MSM continue to experience suboptimal rates of adherence and are recognized as one of the most vulnerable populations for HIV infection (Bekker & Hosek, 2015; Voisin et al., 2017). Exploration of the research topic could help to fill the gap in research and practice among young adult HIV + MSM who experience disproportionately high rates of new HIV infection compared to other MSM populations. Delineating factors that contribute to the increased rates of newly diagnosed HIV infections may assist in determining factors that contribute to youth's nonadherence to ART and provide insights regarding the significance of creating young adult-centered prevention strategies within a social-economic context for key populations such as MSM.

Secondary data used to measure ART adherence obtained from the GDPH GMMP was used to conduct the analysis. This original data set consisted of 400

participants who were sampled annually from 28 to 38 of the sampled facilities (GDPH, 2015). Over the five-year project period of the original study, 795 participants finished the questionnaire, and their medical records were abstracted and used in the research study (GDPH, 2015). Of the 795 individuals who completed the questionnaire, only 227 were 18 to 39 years of age. The final analytical sample consisted of 184 males who identified as homosexual or gay. The descriptive analysis of the sample included 132 participants (71.7%) who were Black or African American, 26 (14.1%) White, and 26 (14.1 %) other. With respect to age, 119 (64.7%) were between the ages of 30 and 39 and 42 (22.8%) were between 25 and29. A majority of 88 (47.8%) participants had some college, associates, or technical degree and 44 (23.9%) completed grade 12 or a Graduate Educational Development (GED) certificate. A little over half or 97 (52.7%) had annual incomes less than $19,999 and 49 (22.6%) had incomes that ranged from $20,000 to $39,999. One hundred (54.3%) had health insurance that covered ART medications. One hundred thirty-nine or 73.9% of the population were 100% adherent to their ART medication dose, while 90 (48.9%) were 100% adherent to their ART medication instructions and 126 (68.5%) were 100% adherent to the ART medication schedule. Sixty-eight or 37% of population were aware of the importance of ART adherence and 97 (52.7%) were missing data.

The statistical tests used to explore the research questions were chi-square and binomial logistic regression. The chi-square analysis indicated there was not a statistically significant relationship between ART awareness and ART medication dose and schedule; however, there was a statistically significant relationship between ART

awareness and ART medication instruction among young HIV+ MSM between the ages of 18 and 39 in Georgia.

The binomial logistic regression indicated there was not a statistically significant relationship between the social determinants for ART medication dose adherence. Additionally, there was not a statistically significant relationship between age, income, and ART insurance coverage and adherence to ART medications and ART medication instruction adherence among young HIV+ MSM between the ages of 18 and 39 in Georgia. There was a statistically significant relationship between educational attainment and ART medication instruction and schedule adherence to ART among young HIV+ MSM between the ages of 18 and 39 in Georgia. There was also a statistically significant relationship between race/ethnicity and ART medication instruction adherence among young HIV+ MSM between the ages of 18 and 39 in Georgia. White non-Hispanics had a higher likelihood of adhering to medication instructions than other races/ethnicities. Persons with educational levels from grades 1 through 11 and persons with some college, associate's, or technical degrees had a higher likelihood of adhering to medication instructions than those with other educational levels (grade 12 or GED and bachelor's degree).

Section 4 will detail the interpretation of the findings and limitations of the study. It will also provide recommendations for further research and implications for professional practice. Lastly, section 4 will detail the final conclusions for the study.

Interpretation of Findings

ART medication adherence is important in controlling viral replication, maintaining health, and reducing viral transmission, and is a significant element in the HIV treatment regimen because it reduces the amount of HIV in an individual's blood. The purpose of this study was to investigate the relationship between factors that influence ART adherence such as diverse social determinants, engagement in care, viral load suppression, and ART adherence among young adult MSM who are HIV+ between the ages of 18 and 39.

The study showed that all social determinants (age, race/ethnicity, educational attainment, income, and ART insurance coverage) were associated with and have the potential to influence ART adherence and served as barriers to optimal ART adherence. Barriers such as lack of engagement and retention of care and socio-demographics. My research did not support the assertion that all social determinants influence ART adherence. Specifically, the study showed that age, income, and ART insurance coverage did not have a statistically significant relationship with awareness and adherence to ART dose, instruction, and schedule or between social determinants and ART adherence to dose, instruction, and schedule.

The study showed that young HIV+ individuals are constantly at the highest risk for suboptimal and nonadherence to care at each stage of the HIV continuum. Additionally, young adults experience poorer rates of retention in care, greater delays in the initiation of ART, and suboptimal rates of viral suppression compared to older adults (Shaw & Amico, 2016). Kay et al. (2017) said the availability of health insurance

influences all stages of the HIV continuum of care. Young adults with HIV/AIDS are among those at higher risk for not having health insurance and experience overall lower rates of health insurance coverage than any other age group (Coetzee et al., 2015; Spencer et al., 2018). According to Nachega et al. (2015), suboptimal ART adherence is related to unemployment and limited fiscal resources.

The statistically significant chi-square results involved awareness and ART medication instruction among young HIV+ MSM between the ages of 18 and 39 in Georgia. The regression model also revealed statistically significant relationships between educational attainment and ART medication instruction and schedule adherence. Additionally, there was a statistically significant relationship between race/ethnicity and ART medication instruction adherence. The statistically significant research findings of my study are consistent with the literature review findings. Specifically, the study showed that there was a positive association between awareness and medication instruction adherence. El-Rachidi et al. (2017) stated young adults may not adhere to their medication regimen because of their lack of knowledge and awareness about HIV or significance of treatment modalities. Educational attainment was a statistically significant predictor of medication instruction adherence and individuals with higher levels of education were more likely to adhere to ART medication instructions. HIV+ individuals with lower educational attainment experience worse health outcomes after they initiate ART because of their nonadherence (del Amo et al., 2017). Additionally, del Amo et al. (2017) study showed that race/ethnicity was a statistically significant predictor of medication instruction adherence. According to Kalichman (2016), racial/ethnic-based

based medical mistrust, late diagnosis, and poor ART adherence are significant predictors of ART nonadherence among people who are HIV+.

The study findings provided evidence to support the theoretical foundation of this study and were consistent with prior research. The study was based on the principles inherent to the SCT, which assumes there is a dynamic and reciprocal interaction of personal factors such as ART awareness about HIV prevention and treatment, and the significance ART adherence plays in living a longer, healthier life and how it reduces the risk of HIV transmission. The significant relationship between awareness, race/ethnicity and educational attainment to ART adherence demonstrates the interaction of the three factors (personal, behavior, and environmental) of the SCT. The SCT is relevant to the management and treatment of chronic diseases such as HIV and the finding of this study, as it may assist individuals with becoming more aware or knowledgeable about their HIV diagnosis and the importance of maintaining optimal adherence to ART.

Limitations of the Study

The research study had several limitations. The study was based on secondary cross-sectional data that was not designed to answer the research questions or to test the specific hypothesis of this study. Additionally, a cross-sectional study does not allow for the prediction of causation (Gross, Hosek, Richards, & Hernandez, 2016). The data was collected via self-reported survey data. Self- reported data may be embellished; respondents may be too uncomfortable or ashamed to reveal private details; and many biases may affect the results, such as social desirability bias. This type of bias occurs

when participants give positive self-descriptions or over or under report behaviors (Ananthram, 2016).

Additionally, the data set was manipulated by the GDPH so that sample sizes less than five were combined with other categories to ensure there was not a breach in the survey participant's confidentiality. The GDPH sponsor shared this information with the researcher. GDPH also included four research questions relative to prevention education or awareness that was not reflected in the GMMP surveillance summary. This summary was used exclusively to draft Sections 1 (Foundation of the Study and Literature Review) and Section 2 (Research Design and Data Collection).

Other limitations of the study included missing variables. Fifty-two percent of the participant responses were missing from the first question related to awareness. Missing data has the potential to not only reduce the statistical power of a study, but may also produce biased estimates, resulting in invalid conclusions (Khang, 2013). Additionally, missing data may decrease the representativeness of the population sample and increase the complexity of analysis, which threatens the validity of the research conclusions (Kang, 2013). The data set did not include the variable that was proposed to serve as the proxy for engagement in care. The variable was from Table 8 of the GDPH MMP data summary (Clinical services provided during the 12 months before the interview, has a place for primary HIV care). In this regard, data required to answer the third proposed research question was unavailable for analysis. In addition to this discrepancy, the data set included four variables that supported prevention services (proxy for awareness)

instead of three that were presented in the MMP data summary and questionnaire. The Cochran formula for smaller sample sizes was used to calculate the sample size.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}$$

Figure 2. Cochran Formula for Smaller Sample.

In the equation, N is the population size, n_0 is the recommended sample sized based on a 95% confidence level (CI). A CI of 95 % yields a critical value (Z) of 1.96 and a margin of error of 0.5, which is 385. The number of participants age 18-39 is 227; therefore, N= 227. n= n0 (385)/ 1+ (n0 (385) - 1)/ N (227) = 385/1+ (384/227) = 385/1+ 2.69 = 385/2.69 = 143. The projected sample size is lower than the actual sample size of 184. The final analytic sample size was small (*N* = 184*)* and it was not reflective of the target population, as 71.7% of participants were African American and the target population was young HIV+ MSM age 18-39 in Georgia. Since the sample is not representative of the target population, it does not serve as a reliable source to draw statistical inferences about the referenced population. A larger sample size will yield greater credibility to the study, as the results are more reliable with greater precision and power, which allows researchers to draw meaningful conclusions (Faber & Fonseca, 2014). Notwithstanding the sample size and power of the study sample, the finding may have limited generalizability to the entire population because this is a cross sectional study thus

serving as a potential threat to the internal validity. The history and selection processes may serve as threats to the internal validity of the study. Specifically, during the four-year time period the study was conducted, participants may have experienced life events that influenced the outcome of the finding. Additionally, all participants were selected based on predetermined characteristics that may contribute to the study outcomes thus threatening the internal validity of the research conclusions.

Recommendations for Future Research

A qualitative study may be employed to ascertain and obtain greater understanding of the implications of how the social determinants influence ART adherence. While the study revealed there was not a statistically significant relationship between age, income and ART insurance coverage and adherence to ART medication dose and instruction adherence, the literature revealed there was a relationship between ART adherence and all the social determinants. A qualitative study could provide clarity about the views and feelings of young HIV+ MSM and interpret their experiences in a manner that offers explanations for their behavior within a given situation or environment. A qualitative study may also assist in uncovering trends in the population's thoughts and opinions and delve deeper into the health-related problems associated with young adult HIV+ MSM adherence to ART.

Future research may include using a more diverse population in the conduction of a longitudinal research design, which would provide greater credibility for a prediction model for ART adherence outcomes. A longitudinal study includes both quantitative and qualitative data, and occurs over time; therefore, it may be time consuming and expensive

to conduct (Caruana et al., 2015). Nevertheless, longitudinal studies are effective in determining patterns over time, exploring the relationship between risk factors and the development of disease, and outcomes of treatments over diverse lengths of time (Caruana et al., 2015). Additionally, these studies have greater power than the current cross-sectional study and can identify changes or difference in the characteristics of the target population at the group and individual level. Further research is needed to explore in greater detail the variables that were predictive of HIV+ MSM adherence to ART, which included awareness, educational attainment, and race/ethnicity. Future research is critical for developing interventions that may mitigate and abate obstacles to optimize ART adherence among young adults, especially challenges relative to the influence social determinants have on adherence.

Implications for Professional Practice and Social Change

Implications for professional practice relative to the study findings may assist public health practitioners with understanding the significance of HIV prevention strategies and awareness about the benefits of ART adherence. It may also encourage practitioners to use clear and concise medication instructions about the significance of ART adherence among all populations. More specifically, the findings may assist practitioners with understanding the importance of implementing strategies relative to adherence to the medication schedule and instructions targeting young HIV+ MSM of color. Likewise, practitioners should be aware that race/ethnicity and educational attainment played a role in how young HIV+ MSM adhere to their medication instructions. According to Iacob et al. (2017), limited communication skills and

educational attainment and other factors contributed to ART nonadherence. Additionally, as a result of these findings, public health practice and policy may be influenced in a manner that facilitates positive change.

The findings may also have implications for social change in that there are limited studies that address ART adherence among the target population. Increased adherence to ART is essential to reducing HIV transmission as well as the quality of life, mortality and morbidity of MSM living with HIV (Lall et al., 2015; NIH, 2018). The knowledge gained from this study, specifically knowledge relative to how awareness about the significance of HIV prevention and ART adherence, educational attainment and race/ethnicity influence ART medication adherence by instruction and schedule may assist in the development of more effective strategies. Strategies that may increase the rate of ART adherence, decrease the rates of HIV transmission among young HIV+ MSM and ultimately prevent death.

Conclusion

Suboptimal adherence was found to be associated with awareness and ART medication instruction adherence, educational attainment and ART medication instruction and schedule adherence and race/ethnicity and ART medication instruction adherence. The study revealed that the most significant statistical association related to ART adherence was related to medication instruction adherence. The study showed that awareness, educational attainment and race/ethnicity had a statistically significant positive association with ART medication instruction adherence. These findings have contributed to the existing knowledge by validating factors that influence ART adherence

among young HIV+ MSM in the state of Georgia. The findings are also consistent with numerous studies related to the influence social determinants have on optimal ART adherence.

It is paramount that there is a comprehensive understanding of factors that influence how MSM comprehend the significance of ART adherence through the HIV continuum. Continuous and ongoing retention in HIV care is a significant indicator for the achievement of optimal HIV management and a critical element of successful treatment and prevention (Colasanti et al., 2016). A comprehensive understanding of the dynamic factors that contribute to suboptimal ART adherence is vital to the morbidity and mortality of the MSM population within the U.S. and globally (Maskew et al., 2016).These finding may lead to positive social change, as they may provide valuable knowledge about the association between factors that promote adherence or those that adversely contribute to suboptimal ART adherence. Gaining knowledge about factors that contribute to youth's nonadherence to ART provides insights relative to the significance of creating young adult-centered prevention strategies within a social-economic context for key populations such as MSM.

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Appendix A: Chi-square Output

Table A1

Results of Awareness Dose Adherence When Taking ART Medicine Crosstabulation

			100% Dose adherence when taking ART medicine		
			Yes, person is 100% adherent	No, person is not 100% adherent	Total
Awareness	Aware	Count	52	11	63
		% within Awareness	82.5%	17.5%	100.0%
		% within 100% Dose adherence when taking ART medicine	77.6%	84.6%	78.8%
		% of Total	65.0%	13.8%	78.8%
	Not Aware	Count	15	2	17
		% within Awareness	88.2%	11.8%	100.0%
		% within 100% Dose adherence when taking ART medicine	22.4%	15.4%	21.3%
		% of Total	18.8%	2.5%	21.3%
Total		Count	67	13	80
		% within Awareness	83.8%	16.3%	100.0%
		% within 100% Dose adherence when taking ART medicine	100.0%	100.0%	100.0%
		% of Total	83.8%	16.3%	100.0%

Source: Wortley & Drenzek, 2015

Table A2

Results of Awareness Instruction Adherence When Taking ART Medicine Crosstabulation

(table continues)

			100% Instruction adherence when taking ART medicine		
			Yes, person is 100% adherent	No, person is not 100% adherent	Total
Awareness	Aware	Count	36	14	50
		% within Awareness	72.0%	28.0%	100.0%
		% within 100% Instruction adherence when taking ART medicine	92.3%	70.0%	84.7%
		% of Total	61.0%	23.7%	84.7%
	Not Aware	Count	3	6	9
		% within Awareness	33.3%	66.7%	100.0%
		% within 100% Instruction adherence when taking ART medicine	7.7%	30.0%	15.3%
		% of Total	5.1%	10.2%	15.3%
Total		Count	39	20	59
		% within Awareness	66.1%	33.9%	100.0%
		% within 100% Instruction adherence when taking ART medicine	100.0%	100.0%	100.0%
		% of Total	66.1%	33.9%	100.0%

Source: Wortley & Drenzek, 2015

Table A3

Results of Awareness Schedule Adherence When Taking ART Medicine Crosstabulation

		100% Schedule adherence when taking ART medicine	Total (*table continues*)

			Yes, person is 100% adherent	No, person is not 100% adherent	
Awareness	Aware	Count	50	13	63
		% within Awareness	79.4%	20.6%	100.0%
		% within 100% Schedule adherence when taking ART medicine	83.3%	65.0%	78.8%
		% of Total	62.5%	16.3%	78.8%
	Not Aware	Count	10	7	17
		% within Awareness	58.8%	41.2%	100.0%
		% within 100% Schedule adherence when taking ART medicine	16.7%	35.0%	21.3%
		% of Total	12.5%	8.8%	21.3%
Total		Count	60	20	80
		% within Awareness	75.0%	25.0%	100.0%
		% within 100% Schedule adherence when taking ART medicine	100.0%	100.0%	100.0%
		% of Total	75.0%	25.0%	100.0%
		% of Total	66.1%	33.9%	100.0%

Source: Wortley & Drenzek, 2015

Appendix B: Regression Output

Table B1

Results of Parameter Estimates for Social Determinates and Predicting Medication Instruction Adherence

100% Instruction adherence when taking ART medicine[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Yes, person is 100% adherent	Intercept	2.058	.894	5.298	1	.021			
	[Age groups at interview date=1]	.513	.653	.618	1	.432	1.670	.465	6.002
	[Age groups at interview date=2]	-.118	.561	.044	1	.834	.889	.296	2.667
	[Age groups at interview date=3]	.061	.547	.013	1	.911	1.063	.364	3.109
	[Age groups at interview date=4]	0[b]	.	.	0	.	.	.	.
	[Race/Ethnicity=1]	-1.781	.818	4.745	1	.029	.168	.034	.836
	[Race/Ethnicity=2]	-.464	.647	.514	1	.473	.629	.177	2.235
	[Race/Ethnicity=9]	0[b]	.	.	0	.	.	.	.
	[Highest level of education=3]	1.667	.841	3.925	1	.048			.982

(*table continues*)

	[Highest level of education=4]	-.342	.751	.208	1	.649	.710	.163	3.093
	[Highest level of education=5]	1.407	.641	4.818	1	.028	.245	.070	.860
	[Highest level of education=6]	0[b]	.	.	0	.	.	.	.
	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=1]	.530	.441	1.444	1	.229	1.699	.716	4.030
	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=2]	.316	1.278	.061	1	.804	1.372	.112	16.796

(*table continues)*

	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=3]	0[b]	.	.	0	.	.	.	.

Source: Wortley & Drenzek, 2015

Table B2

Results of the Pseudo R-Square for Social Determinates and Predicting Medication Instruction

Cox and Snell	.117
Nagelkerke	.165
McFadden	.101

Source: Wortley & Drenzek, 2015

Table B3

Results of the Parameter Estimates Results for Social Determinates and Predicting Medication Schedule Adherence

								95% Confidence Interval for Exp(B)	
100% Schedule adherence when taking ART medicine[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
Yes, person is 100% adherent	Intercept	18.535	.664	778.168	1	.000			
	[Age groups at interview date=1]	-.460	.608	.573	1	.449	.631	.192	2.077

(table continues)

[Age groups at interview date=2]	.176	.560	.098	1	.754	1.192	.398	3.569
[Age groups at interview date=3]	.677	.576	1.380	1	.240	1.968	.636	6.089
[Age groups at interview date=4]	0[b]	.	.	0	.	.	.	.
[Race/Ethnicity=2]	.197	.583	.114	1	.735	1.218	.388	3.819
[Race/Ethnicity=9]	0[b]	.	.	0	.	.	.	.
[Highest level of education=3]	-18.366	.671	748.741	1	.000	1.056E-8	2.834E-9	3.936E-8
[Highest level of education=4]	-18.111	.481	1415.406	1	.000	1.363E-8	5.305E-9	3.501E-8
[Highest level of education=5]	-18.529	.000	.	1	.	8.971E-9	8.971E-9	8.971E-9
[Highest level of education=6]	0[b]	.	.	0	.	.	.	.

(*table continues)*

	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=1]	.829	.432	3.676	1	.055	2.291	.982	5.347	
	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=2]	.334	1.249	072	1	.789	1.396	.121	16.138	
	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=3]	0[b]	.	.	0	.	.	.	.	.

(*table continues*)

	[Had any health insurance or antiretroviral medicines (ARVs) were paid by any health insurance in the P12M=2]	.334	1.249	072	1	.789	1.396	.121	16.138

Source: Wortley & Drenzek, 2015

Table B4

Results of the Pseudo R-Square for Social Determinants and Predicting Medication Instruction Adherence

Cox and Snell	.168
Nagelkerke	.256
McFadden	.172

Source: Wortley & Drenzek, 2015